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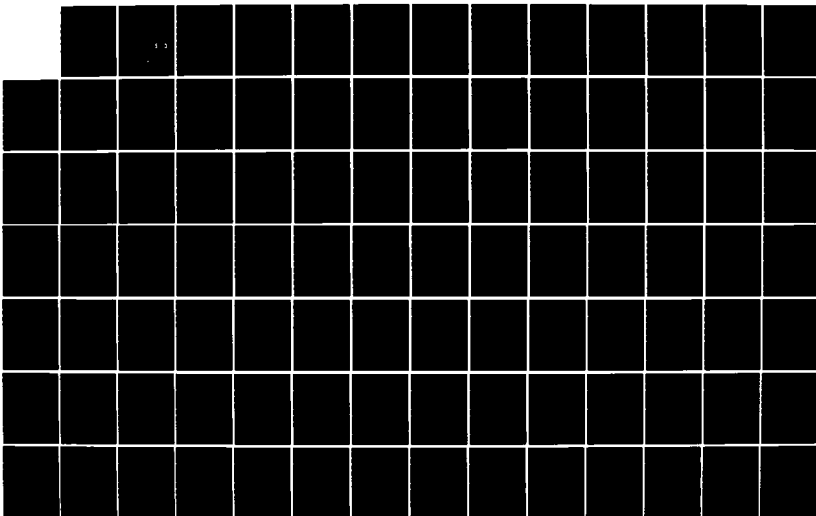
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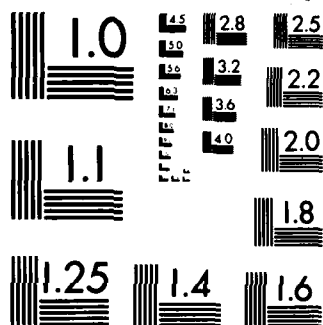
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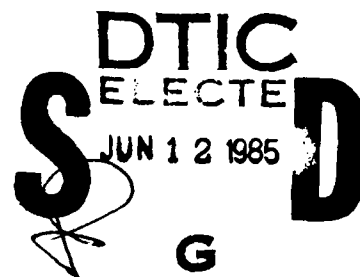
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Systems Engineering Service  
Washington, D.C. 20591

**Response to NAS Plan  
Audit Report  
Recommendations**

March 1985  
Final Report



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U.S. Department of Transportation  
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# Technical Report Documentation Page

|   |  |   |           |               |  |            |                                     |          |                          |             |                          |               |  |    |  |               |  |                    |  |      |                      |           |  |
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## FOREWORD

This document contains FAA's position and response to each of the System Engineering and Integration (SEI) contractor's recommendations as provided in section 6 of the NAS Plan Audit Report, dated August 1984. It is organized to reflect the major categories of the NAS Plan Audit Report Recommendations.

Sections 3, 4, and 5 of this document detail FAA responses to NAS Plan assessment, integration findings, and NAS Plan project recommendations in that order.

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## 1.0 EXECUTIVE SUMMARY

On August 3, 1984, the System Engineering and Integration (SEI) contractor Martin Marietta, completed a contractually required audit of FAA's NAS plan for Facilities, Equipment and Associated Development and delivered to FAA a NAS Plan Audit Report containing findings and recommendations. Martin Marietta found that the NAS plan is well conceived and properly conservative. The audit indicated that the planned \$11.4 billion funding for the years 1983-1992 is realistic with an equal chance of underrunning or overrunning. The audit also established that the attainment of an 80% confidence level in the adequacy of program funding, which is a more conservative commercial estimating practice, potentially requires an additional \$2.3 billion. The recommendations identify actions which should be pursued to assure the orderly implementation of the NAS Plan.

The audit report contains 203 recommendations which were reviewed in detail by the FAA. In categorizing the recommendations, it was found that approximately 25 percent relate to the NAS Plan as a whole and to management methods for system procurement, development and integration. About 75 percent pertain to details of individual projects and the related plans. It was also noteworthy that the large majority of recommended actions were already being taken or are included as tasks in the statement of work for the SEI contractor. Thus, the audit basically confirmed the need to continue most of the activities already planned for the NAS Modernization Program.

There were, however, several new initiatives proposed by the SEI contractor. The most notable of these were to develop a Safety Program Plan and an Operational System Development Plan.

Of the 203 recommendations in the report: 159 were fully accepted, 34 were partially accepted, and 10 were rejected by the FAA. The 159 recommendations accepted and 34 recommendations partially accepted are being incorporated within the programs. The 10 recommendations rejected by the FAA were based upon management judgment that these particular recommendations were either impractical or would not be advantageous to the NAS Modernization Program.

## 2.0 INTRODUCTION

### 2.1 Background

In February 1984, a contract was awarded to Martin Marietta to provide management and technical support to the FAA in implementing the NAS Plan. As part of that contract, Martin Marietta was tasked to conduct an independent assessment of the overall goals and objectives of the NAS Plan from the standpoint of technical validity and feasibility, system safety, user benefits, methods, costs, and schedules. Included in this effort was an objective review of NAS historical data, funding commitments, user data, functional allocations, fiscal program and project requirements, and NAS Plan goals, objectives, and performance requirements. The purposes for this independent assessment were to strengthen the NAS Plan, provide results which form the basis of the 1984 NAS plan update activities, and at the same time give the SEI contractor an indepth understanding of the details of the NAS Plan to better prepare them to accept mission accountability.

On August 3, 1984, the SEI contractor completed the audit of the NAS Plan and delivered to the FAA a NAS Plan Audit Report containing findings and recommendations. These findings indicate that the original NAS funding plan of \$11.4 billion for the years 1983 through 1992 is adequate and that the NAS plan is well conceived and is properly conservative, in that it applies state-of-the-art technology to NAS modernization. Martin Marietta's assessment is that the FAA's \$11.4 billion funding estimate for the NAS Plan corresponds to a confidence level of 50 percent. To increase this level of confidence to 80 percent, it would be necessary to add \$2.3 billion to the 10-year funding plan. The other recommendations in the audit pertain to areas of system engineering, project management and planning with the objective being to improve the likelihood of success in NAS Plan implementation.

### 2.2 Purpose

The importance of the NAS Plan Audit Report dictates that FAA's response on each audit report recommendation be carefully considered. This document, details FAA's position and response on each of the SEI contractor's recommendations. It also serves to punctuate the SEI contractor's responsibilities in implementing the NAS Plan. With respect to the role of the SEI contractor, this document sheds further light on NAS program support activities required of them.

### 2.3 Approach

In developing FAA's response and position on NAS Plan Audit Report recommendations, the Systems Engineering Service within FAA played a lead role in coordinating all audit report activities and integrating all report recommendation responses. Information briefings on key NAS plan audit report findings and recommendations were provided to the FAA Associate Administrators, the FAA Administrator, and the Deputy Secretary of Transportation. The audit report recommendations were divided into essentially two categories, those involving management issues and those involving program or project specific issues. Working groups drawn from responsible FAA organizations at various management

levels were used to develop initial FAA responses to management issues, while program or project specific recommendations were assigned to the responsible FAA program or project manager. The SEI contractor was called upon by the working group or program/project manager whenever clarification or additional information regarding a given recommendation was required. Through this approach, responses were developed for all NAS Plan Audit Report recommendations by the FAA organizational element(s) most familiar with the subject and responsible for accomplishment. The proposed responses of the working group and program or project manager were further reviewed by FAA's management to assure that the responses were appropriate. These responses were coordinated and approved by the FAA Associate Administrators, the FAA Administrator, and the Office of the Secretary of Transportation.

The following sections contain FAA responses to audit report recommendations outlined in section 6 of the NAS Plan Audit Report. Sections 3, 4, and 5 of this document detail FAA responses to NAS plan assessment, integration findings, and NAS plan project recommendations in that order.

### 3.0 NAS Plan Assessment

The SEI contractor assessed the feasibility and validity of the NAS Plan in the areas of schedule, technical risk, cost, benefits, system safety, and FAA methods and plans. Their audit indicates that all NAS Plan projects are feasible and, on the whole, the cost, schedule, benefits, and technical risk are appropriate. As a result of their investigation, they have made 17 recommendations in areas which they believe require continued FAA attention to minimize the risk associated with the modernization of the National Airspace System. These recommendations are either fully accepted or partially accepted by the FAA. With the exception of the audit recommendations concerning more formalized safety planning, the FAA had work underway or planned to implement the recommendations. Sixteen of them will be accommodated to some degree as a function of activities which are included in the SEI contract.

#### 4.8 DISPOSITION OF RECOMMENDATION FROM 6.2.8 - TRANSITION PLANNING

Recommendation: The lack of an integrated plan that provides guidance for evolution to a modernized NAS is recognized even at this time. Many planning activities will, of necessity, be limited in scope until an overall plan for phasing of NAS capabilities into the existing system can be marketed. We recommend the development of a program transition plan on an expedited basis.

DISPOSITON. Accepted

The need for transition planning has long been recognized by the FAA, and this task is included as part of the SEI contract. The FAA has already initiated SEI contractor activities to formulate the technical approach to preparing such a transition plan. This plan will be responsive to FAA's operational implementation of NAS plan projects and will dictate when changes to the operational system development plan and other related documents are needed.

#### 4.7 DISPOSITION OF RECOMMENDATIONS FROM 6.2.7 - SYSTEM SOFTWARE MAINTENANCE PLANNING

Recommendation 1: Development of a system software plan is recommended as a subtier document to the Operational System Development Plan. The software plan should identify needed resource and implementation projects for inclusion in the Operational System Development Plan. Software responsibilities are presently divided between the Air Traffic Service and Program Engineering and Maintenance (within ADL) for operational system software and maintenance system software, respectively. New system design concepts, which will merge equipment diagnostics and remote maintenance monitor data acquisition and formatting with operational system programming, will render these former distinctions obsolete. We recommend that a single software development and maintenance organization be established. It should be operationally oriented with strong technical support from system engineering and program engineering.

Disposition: Rejected.

A single system software plan and development and maintenance organization is not required. Experience within FAA has shown that there is a prudent division of responsibilities within the software maintenance arena into "operational software" and "technical software" and, furthermore, that these should properly be the jurisdiction of the Air Traffic and the Airways Facilities organization, respectively. Operational software is intimately tied to the overall process of air traffic control (e.g., conflict alert parameters, MSAW system parameters, etc.) and organizationally should be considered as an integral part of the air traffic control operational responsibilities. In a complementary way, the software associated with the more routine functions of the NAS technical facilities (and which are generally not directly visible to the controller) should be the jurisdiction of the Airway Facilities activities. Such an approach has provided the Air Traffic Service with the needed internal operational flexibility to modify the software in response to sudden changes in operational procedures taking into full account the uniqueness of the operational procedures and separation techniques used in the science of air traffic control. Common configuration management procedures are applied for all baselined software, operational and technical.

Recommendation 2. To develop the system software plan, we recommend a composite team of Air Traffic, Systems Engineering, Program Maintenance, and SEI contractor personnel. The software plan should address methods, procedures, required resources, tasks, and management of both software and firmware startup and ongoing maintenance activities. The plan should also define roles and responsibilities of development contractors relative to turn-over procedures, configuration baselining, documentation requirements, etc.

Disposition: Rejected.

The FAA has in place a structure for addressing methods, procedures, required resources, tasks, and management of both software and firmware startup and ongoing maintenance activities. Software maintenance and software and firmware startup is being managed as an integral part of the total NAS Configuration Management process. The management process is under the guidance, direction, and control of the NAS Configuration Control Board.



#### 4.6 DISPOSITION OF RECOMMENDATIONS FROM 6.2.6 - TECHNICAL CENTER PLANNING

Recommendation 1: Development of a Test and Integration Plan to define required FAA Technical Center system integration tasks and responsibilities for each of the F&E Plan projects. The Plan must incorporate realistic schedules that reflect project dependencies and capability milestones. It should define configuration requirement and dependencies on System Support Laboratory and General Support Laboratory resources, including any new resource requirements needed. It should also provide estimates of operational loadings on each of the FAA Technical Center facilities with planning for mitigation of overload conditions.

Disposition: Accepted

A Test and Integration Plan is being developed. As the first step, a working group has been formed to prepare a standard for system testing against which current program plans can be compared. Follow on steps will determine the type of testing required for each program and will identify the equipment resources required at the Technical Center.

Recommendation 2: Development of a resource plan to manage, develop, schedule, allocate, operate, and maintain essential resources. Resource definition must include requirements for personnel, facilities, utilities, communication-voice and data, data processing, simulation, configuration switching, instrumentation, data storage/retrieval, transportation, etc.

Disposition: Accepted

Following completion of the Test and Integration Plan, a resource plan will be developed by the FAA Technical Center. This plan will include an assessment of the resources required for procedures development and flight inspection. Also, the the Civil Aeromedical Institute (CAMI) will be included in this resource needs assessment.

Recommendation 3: Development and submittal of budget requirements and implementation plans.

Disposition: Accepted

The Technical Center will prepare budget estimates for necessary testbed improvement.

Recommendation 4: Procurement, installation, checkout, and validation of expanded resources and associated operating procedures.

Disposition: Accepted

The Technical Center will manage the implementation of testbed resources.

#### 4.5 DISPOSITION OF RECOMMENDATION FROM 6.2.5 INTERFACE COORDINATION.

Recommendation: We recommend that interface activities be assigned to an interface working group (IWG). This working group should have a basic FAA/SEI membership supplemented by representatives of FAA organizations responsible for internal and external interface coordination, as appropriate, for each interface. For external interfaces, it should be chartered to develop agreements and definition of required interfaces to schedules consistent with program needs. For internal interfaces, it should oversee, manage, and approve interface definition and specification documents generated by Level I Design activities. It should also schedule, review, and approve detailed ICD's generated internally or by subcontractors. Products of the working group should be approved ICD's for release, control, and distribution under the configuration management system.

Disposition: Rejected.

A separate, new working group to be responsible for interface activities is not necessary and would overlap with existing responsibilities and procedures.

The Level I Design document for the National Airspace System, baselined in October 1984 with support from the SEI contractor, identifies all system interfaces. For each system interface, formal Interface Control Documents (ICD's) are required and are being produced by the responsible program managers. In addition, a configuration management process supported by the SEI contractor has been established to control any proposed changes which effect system interfaces. The processes for internal interface coordination and control are well established and are functioning effectively.

The interfaces with external agencies and equipment, such as military systems, are also being managed effectively with current procedures. For programs that interface with the military systems, program managers perform the necessary coordination, with the assistance of military officers assigned to the FAA to support this function. In addition, there are numerous working groups and coordination committees already established, such as the DOD Coordinating Committee, Traffic Control and Landing System (TRACALS) meetings, Joint Surveillance Site Working Group, etc. FAA is similarly involved with civil and private industry groups to coordinate interfaces. Finally, the FAA regions have specific responsibility for coordination at field locations and with external agency representatives in the Regional areas.

#### 4.4 DISPOSITION OF RECOMMENDATION FROM 6.2.4 - OPERATIONAL SYSTEM DEVELOPMENT PLAN

Recommendation: An operational system development plan to define standards and procedure development efforts is needed for correlation with NAS F&E and Airport Improvement project activities. Development of such a plan under Air Traffic Service auspices is highly recommended to assure timely availability of needed standards and procedures and early involvement of standards and procedures personnel in NAS modernization activities.

Disposition: Accepted.

We concur with the recommendation that an Operational System Development Plan be prepared. An FAA group will be established with representatives from AAT, AVS, ARP, ADL, and APO to prepare this plan. This group would review the NAS Operations Concept, NAS Plan for Facilities and Equipment, results of the National Airspace Review (NAR) process, the National Plan for Integrated Airport Systems, and other related documents. All changes or new procedures and standards required to capitalize on the capabilities will be identified. The group would consider changes to, or requirements for, new planning and operational standards, operating handbooks, the Airmen's Information Manual, Advisory Circulars, and the Federal Aviation Regulations. Studies required to determine the need for new procedures and actions to be taken will be identified. Operational System Development Plans will identify and document the organizations responsible for preparing each change or new item and the date by which it is required.

#### 4.3 DISPOSITION OF RECOMMENDATION FROM 6.2.3 - ADDITIONAL NAS PLAN PROJECT REQUIREMENTS

Recommendation: We understand that APM has efforts underway to develop recommendations for alleviation of conditions at the NY TRACON and ARTS-III facilities and for System 7 flight data processing equipment replacement at EARTS facilities. We suggest continuation and expansion of these efforts, as necessary, to include solutions for all affected facilities and to expedite system enhancements via new NAS Plan project definitions.

Disposition: Partially Accepted

A requirements process is being established to review proposed changes to the National Airspace System. Future new requirements will be subject to rigorous system engineering analysis to determine costs, benefits, and required schedules. These analysis will be heavily supported by the SEI contractor. The determination to accept substantial new requirements as part of the NAS Plan, however, requires additional monetary resources for both contractual and operations and maintenance costs.

The benefits and costs for the new NAS Plan project requirements identified by the SEI contractor will be established during the NAS Plan update process. If approved by the NAS Plan Executive Committee (EXCOM), the Administrator, the Department of Transportation (DOT), and the Office of Management and Budget (OMB), they will be incorporated in the 1985 edition of the NAS Plan.

#### 4.2 DISPOSITION OF RECOMMENDATION FROM 6.2.2 - NAS PLAN PROJECT CONSOLIDATIONS

Recommendation: While many of discontinuities and/or omissions in project descriptions can be corrected in future updates to the NAS Plan, we believe that improved management insight for definition and program integration can be achieved by consolidating some of the functional or discipline-related project efforts. Candidate project consolidations are:

- A.1. Unmanned FAA Airway Facilities Buildings and Plan Equipment (6-08)
  - 2. Power Systems (6-07)
  - 3. Communications Facilities Consolidations (4-02)
- B.1. ATCT/TRACON Establishment, Replacement, and Modernization (2-13)
  - 2. VFR Tower Closures (2-14)
  - 3. Power Conditioning Systems for Automated Radar Terminal Systems III (ARTS-III) (6-06)
- C.1. ARTCC Plant Modernization (6-09)
  - 2. ARTCC Plan Expansion (Part of 1-07)
- D.1. Airport Telecommunications (5-05)
  - 2. Airport Power Cable Loop Systems (6-05)

Whether project consolidations are adopted or not, there is a need to:

- 1) Expand NAS Plan project scope, schedule, and dependency definitions.
- 2) Provide or revise internal FAA working documentation to further develop interface dependency milestones and schedules.

Disposition: Partially accepted

The necessity to consolidate or update projects in the NAS Plan is explored by the FAA/SEI contractor during the NAS Plan update process. To maintain consistency with previous editions of the NAS Plan, it is expected that projects will be clarified, rather than consolidated.

#### 4.1 DISPOSITION OF RECOMMENDATION FROM 6.2.1 - NAS PLANNING STRUCTURE

Recommendation: Adoption of the planning structure proposed is recommended to provide better visibility and association of all needed NAS program activities. It will require the development of new Operational System Development Plan and potential modifications of other related plans to focus all associated organizational efforts into a group of comprehensive and integrated NAS program plans. Subsidiary benefits will be more mutual recognition of objectives, better definition of needed resources, and user participation early in the system development process.

Disposition: Accepted.

We concur with the adoption of a planning structure that integrates all planning activities. The need to ensure that agency planning is comprehensive, consistent, and well coordinated has been recognized within FAA. As a result, a task force was appointed by the Administrator's Management Team (AMT) to develop the concepts for a new comprehensive planning process. In June 1984 the Administrator endorsed the concept and directed that the agency move forward with implementation.

The first step in institutionalizing the new process is the revision of Order 1800.13C, Planning and Resource Allocation. A draft has been prepared and is in coordination within the FAA.

#### 4.0 INTEGRATION FINDINGS

The SEI contractor reviewed FAA resources, management approaches and methodology, and operational capabilities during the course of their audit of the NAS Plan. Though they found the NAS Plan to be well conceived, they have documented several integration areas of concern in NAS planning, acquisition strategies, operations/maintenance concepts and support activities, programmatic dependencies, FAA Technical Center resources, and program integration activities which they believe require attention to mitigate the risk associated with the modernization of the National Airspace System. As a result, they made 34 recommendations concerning NAS Plan integration findings. Ninety percent of these recommendations are either accepted or partially accepted by the FAA. Three recommendations pertaining to organizational change for interface coordination and software maintenance are rejected. These recommendations were rejected by the FAA, since an established and effective organizational structure exists to deal with these areas. The large majority of the remaining recommendations relate to areas of concern already recognized and acted upon by FAA. Twenty-two of these recommendations will be accommodated to some degree as a function of activities which are included in the SEI contract. The one major new initiative accepted by FAA is related to Operational System Development Planning.

### 3.4 DISPOSITION OF RECOMMENDATIONS FROM 6.1.5 - SAFETY SYSTEM

Recommendation 1): Prepare a NAS safety program plan.

Disposition: Accepted

A safety program plan will be prepared. FAA will establish a safety working group to prepare this plan. The group will be chaired by a representative from the Office of Aviation Safety and will include representatives from ADL, AVS, and AAT. Outside contractors may be utilized to support this activity.

Recommendation 2): Prepare a NAS plan related safety standard similar to MIL-STD-882 (called for on the AAS contract) to provide uniform safety requirements to NAS plan projects.

Disposition: Partially Accepted

MIL-STD-882 will be reviewed by the Safety Working Group to determine the need for a similar standard for the NAS Plan. Such a standard, if needed, should be specifically tailored to the requirements of the NAS plan elements.

Recommendation 3): Determine requirements for establishing and quantifying a safety baseline as a means of measuring safety accomplishments.

Disposition: Partially Accepted

The Safety Working Group will determine the need for reviewing NAS safety activities and recommending changes in current procedures to ensure NAS safety. The working group will assess the impact on safety of system improvements.

Recommendation 4): Determine requirements for independent safety assessment and monitoring of the transition process.

Disposition: Partially Accepted

The Safety Working Group will determine the need to evaluate the safety implications of transition and implementation.



Recommendation 5): Incorporation of mutually agreed-upon assumptions and forecasting techniques with ATC and AF planning departments.

Disposition: Accepted

The SEI contractor, as part of their support of updating the NAS Plan, will use mutually agreed-upon assumption and forecasting techniques to establish NAS Plan benefits.

Recommendation 6): The benefits to ATC and AF direct workloads are explicitly defined by project. To realize the full benefits of the NAS Plan, actions to proportionally reduce support and overhead positions must also be identified. For example, organization structures, maintenance policies, and ATC and AF staffing standards must be aggressively reviewed to avoid continuing practices made unnecessary by NAS Plan implementation.

Disposition: Accepted

ATC and AF staffing, including overhead positions, are reviewed by FAA management during the budget and resource allocation process. FAA management, with SEI contractor support, will assure that resultant position requirements are consistent with NAS Plan implementation.

### 3.3 DISPOSITION OF RECOMMENDATIONS FROM 6.1.4 - BENEFITS

Recommendation 1): Management action committees in the areas of personnel and community involvement in consolidation and transition plans.

Disposition: Partially Accepted.

Action plans for personnel and community involvement in consolidation and transition planning are being developed where required. For some of the major FAA programs, such as FSAS, the program manager has taken the lead role to develop and implement such an action plan. For others, the FAA Administrator and FAA Regions have undertaken the responsibility to assure personnel and community involvement in consolidation and transition planning.

Recommendation 2): Integration of human resource planning with NAS Plan commissioning schedules to facilitate top-down management of labor force reductions.

Disposition: Accepted

FAA has taken the first step towards integrating human resource planning with NAS Plan commissioning schedules. The first Airway Facilities Human Resource Plan has been issued and will be updated periodically. Additionally, the SEI contractor is tasked under the SEI contract to correlate FAA staffing reductions to NAS Plan commissioning schedules. This will form the basis for additional human resource planning.

Recommendation 3): Continuing improvement of the traceability of FAA and user benefits to specific project actions, functional enhancements, and equipment transitions.

Disposition: Accepted

Martin Marietta is tasked, as part of the System Engineering and Integration contract, to improve the traceability of FAA and user benefits to functional enhancements and specific project actions or actions related to groups of projects.

Recommendation 4): Incorporation of detailed, quantitative treatment of the benefits to users by class in order to provide users with a basis for acceptance.

Disposition: Accepted

The SEI contractor is tasked to satisfy this recommendation as part of the System Engineering and Integration contract.

### 3.2 DISPOSITION OF RECOMMENDATIONS FROM 6.1.3 - PROGRAM COST

Recommendation 1): A consistent estimating system and methodology to be applied to each project should be developed. A well-documented basis of estimate is necessary to ensure traceability and establish a consistent confidence level of each project.

Disposition: Accepted

FAA currently estimates program cost in accordance with agency orders, including Orders 1810.3, Cost Estimation Policy and Procedures, and 6011.4, F&E Cost Estimating Procedures and Summaries Handbook. The FAA recognizes the need to assure traceability and establish a consistent confidence level and has tasked the SEI contractor with developing parametric estimating procedures for all NAS Plan projects.

Recommendation 2): Each project should be reviewed to determine completeness and accuracy of the statement of work as currently defined.

Disposition: Accepted

All NAS Plan projects are currently being reviewed for accuracy and completeness by the FAA and SEI contractor on a yearly basis as part of the NAS Plan update process. In addition, the statements of work for new projects will be reviewed by FAA and the SEI contractor for accuracy and completeness before they are released for solicitation to offerors of FAA equipment or services.

Recommendation 3): Systematically categorize all hardware and software by low, medium, or high risk of specification and/or contract change.

Disposition: Accepted

Martin Marietta is tasked under the SEI contract to determine and categorize the risk associated with each NAS Plan project and major project elements, including hardware and software. Work on this is currently underway.

Recommendation 4): As the program matures, each type of project contract arrangement must be individually addressed and assigned a weighting factor commensurate with the associated risk.

Disposition: Accepted

The SEI contractor is tasked under the SEI contract to perform risk analysis on NAS projects to determine schedule, cost, and technical performance risks. Work on this is currently underway.

### 3.1 DISPOSITION OF RECOMMENDATIONS FROM 6.1.2 - PROGRAM SCHEDULE

Recommendation 1): Develop and monitor a hierarchy of schedules from the master schedule (NAS Plan) level down to individual system and/or capability levels.

Disposition: Accepted.

Martin Marietta is tasked under the System Engineering and Integration (SEI) contract to develop a hierarchy of schedules from the program master schedule down to the project schedule. Work on this is currently underway. The hierarchy of schedules to be provided will build on existing NAS Plan project programmatic dependencies. The hierarchy of schedules will cover the entire system acquisition and field implementation process.

Recommendation 2): Initiate critical path analyses on all major programs/projects to determine windows of opportunity for significant future decision events.

Disposition: Accepted

As part of the SEI contract, Martin Marietta will initiate critical path analyses on all major programs/projects and identify areas of project activity that will receive FAA management attention.

Recommendation 3): Readjust individual project schedules as appropriate to reflect current NAS Plan status.

Disposition: Accepted

Individual NAS Plan project schedules are reviewed and updated by FAA and the SEI contractor during the NAS Plan update process. The 1985 edition of the NAS Plan will incorporate these changes and will be available April 1985.

#### 4.9 DISPOSITION OF RECOMMENDATIONS FROM 6.2.9 - ACQUISITION STRATEGY

Recommendation 1. Evaluate acquisition strategies, particularly for AWOS and VSCS.

Disposition: Accepted

The FAA, in consultation with the SEI contractor, has re-evaluated the acquisition strategy for AWOS and VSCS after the audit was received. The AWOS strategy is designed, inter alia, to be responsive to the requirements of the 8A Pilot Program which was imposed on DOT and FAA. Thus, the flexibility in structuring the procurement approach was constrained. A second production contract is part of the acquisition strategy because of the need for competition for the subsequent acquisition of a large volume of production systems in the next few years, both for Federal and non-Federal sites. Cost reduction are expected due to competitive pricing of the subsequent acquisitions.

The VSCS acquisition approach has been reviewed exhaustively, giving full consideration to the SEI recommendations for this program, and the approach recommended to the DOT Acquisition Executive has been modified to address the concerns. The selected approaches for both programs has been included in Key Decision Memoranda and will be forwarded to OST for approval in the Selection Plans for the programs.

The SEI will be involved in future re-evaluation of FAA Acquisition Strategies on a case-by-case basis.

Recommendation 2. Review and finalization of specifications to establish definitive baseline requirements prior to contract awards. After award, the competitive environment may be altered, cost proposals may be divergent, and negotiations complicated by differences in design and implementation approaches.

Disposition: Accepted.

FAA Order 6030.28D, "Preparation, Processing, and Management of Specifications, Orders and Interface Control Documents," provides for formal review and baselining of specifications that will be included in production procurements. We will initiate a review of this order, with the objective to determine whether it should also be applied to specifications at Key Decision Point #3 and if the product of this phase is a production prototype, first article, or limited production system.

Recommendation 3. Development and implementation of a management plan to address concerns described in the preceding findings discussion.

Disposition: Partially Acceptance

The existing DOT Orders 4200.9A and 4200.14A provide the management guidelines and requirements for the process of developing and reviewing acquisition strategies. Within those guidelines, additional top-level attention is being given by the NAS Plan Director to planning acquisition strategies for the NA<sup>^</sup> Plan programs. A separate management plan is not judged to be necessary. In addition, the staff of the Assistant Secretary of Transportation for Administration is routinely consulted to exploit their advice and expertise in these matters.

Recommendation 4. Dedication of appropriate personnel resources to adequately support management plan implementation.

Disposition: Partially Acceptance.

There is a shortfall in the number of personnel resources available in ADL and ALG to fully support management planning for acquisition strategies and to aggressively administer contracts in force. SEI resources will be used to supplement inhouse personnel where appropriate. The other tradeoff that will be considered on a case-by-case basis is the time consumed by exhaustive deliberations about acquisition strategies. Truncation of the process is sometimes justified when the management plan appears to be forthright or when the program itself lacks a high degree of complexity.

Recommendation 5. Inclusion in contract conditions of the necessary options to reduce or terminate part, or all, of contract efforts at selected milestone points (PDR, CDR) if design and implementation approaches appear unacceptable or nonproductive.

Disposition: Accepted.

It is standard Government policy to include termination provisions in every contract. This policy, which is specified in the Federal Acquisition Regulations, Part 49, allows for complete or partial termination of contracts any time during the course of the contract for the convenience of the Government or for default. The termination procedures are based upon longstanding legal principles which have been refined over many years based upon legal statutes, GAO decisions, and practical application.

Recommendation 6. Procurement of production engineering documentation for high production projects to establish options for multiple source production and to maintain a competitive environment.

Disposition: Accepted

It is FAA policy, as set forth in FAA Order 4405.15 dated 4/19/84, that reprourement data shall be acquired together with NAS systems and equipment unless an evaluation of costs, benefits, and other relevant factors indicates an unfavorable balance. Acquisition of reprourement data is based on the evaluation of all relevant factors, with the following as a minimum:

- (a) The system/equipment complexity and technical risks.
- (b) The quantity required.
- (c) The procurement lead time.
- (d) The number of procurements planned and the intervals involved.
- (e) The requirement for standardization.
- (f) The "start-up" cost, including design, facilities, tooling, manufacturing, learning, etc.
- (g) The availability of qualified sources.
- (h) The status of development and test.
- (i) The availability of equivalent commercial items.
- (j) The acquisition plan for maintenance and logistics support.
- (k) The estimated cost difference between procurement with and without reprourement data.
- (l) The cost and problems anticipated in obtaining necessary and sufficient manufacturing data for effective use by a second source, including related data rights.

Recommendation 7. Consideration a third-party effort, if necessary, to merge divergent design and/or implementation approaches into a preferred configuration with specifications and design products sufficient for production contracting.

Disposition: Partially Accepted

This can be considered as an alternative at the end of the design competition phase, if neither system is judged to be suitable for production. However, this is typically not the FAA's intent. The result of such action would be a new competitive procurement with the attendant loss of time and the potential elimination of both of the contractors with design competition phase experience. There is no assurance that either of the design competition contractors would win the production contract.

Recommendation 8. Development of a comprehensive run-off criteria document for distribution to contractors and evaluation teams. The criteria should focus on design validity and acceptability, support system requirements and design, implementation approaches, projected life-cycle costs, and contractor performance. In addition, the criteria should define how run-off assessments will be weighted with respect to production proposal evaluations.

Disposition: Partially Accepted

The various NAS Plan programs are so different in specific details that unique run-off criteria are developed for each case. However, if a general guideline with checklist is available from DOD, NASA, or other agencies, it would certainly be useful. The SEI contractor will be requested to recommend such a source. If available, it will be provided to the VSCS program manager and ALG for review/concurrence prior to its use as a test case to determine its value.



#### 4.10 DISPOSITION OF RECOMMENDATION FROM 6.2.10 - NAS OPERATIONS CONCEPT

Recommendation: We recommend that the FAA immediately direct the preparation of a NAS operations concept document to communicate to all personnel involved in the design and development of the NAS and its subsystems, the operator/user view, and how the various hardware and software portions of the envisioned NAS are expected to operate in the satisfaction of the operations requirements.

Disposition: Accepted

We concur with the recommendation regarding the need for a NAS operations concept(s). The Systems Engineering Service, Aviation Standards and Air Traffic are currently developing a definition of operations concept documentation and a plan for document preparation. It is intended that the En Route/Terminal ATC operations concept document, Operations Concept for the AAS Man-Machine Interface, prepared by the Advanced Automation Program Office would be used as model and basis for this effort. There may also be specific programs identified where the early development of individual operations concepts will be required.

#### 4.11 DISPOSITION OF RECOMMENDATIONS FROM 6.2.11 - MAINTENANCE CONCEPT DEVELOPMENT

Recommendation 1: A top-down set of system design requirements needs to be developed for the maintenance system designed to be in effect in the 1995 era when the NAS Plan has been accomplished. The maintenance system referred to herein is the set of projects (RMMS, CBI, CRF, MCC, and the logistics elements of the general support projects) that must be integrated with each other and with other NAS projects (telecommunications, etc.) to transition into the maintenance system of the 1995 era. The maintenance system design must be structured about and driven by a maintenance concept that must be thoroughly analyzed, evaluated, and defined at the earliest possible date.

Disposition: Accepted

The system design for Maintenance and Operations Support is included in the Level I Design document baselined in October 1984. This document defines the total NAS System Requirements and basic NAS elements, facilities, equipment, and their interrelationships. The next level of detail on Maintenance performance requirements will be contained in the Level II Design document being prepared by the FAA with SEI contractor support. These documents support the maintenance concept for the maintenance program of the 1980's established in draft Order 6000.27A.

Recommendation 2: The maintenance summary information contained in Chapter 6, pages 1 through 3 of the NAS plan, should be expanded/updated to incorporate a summary of the findings of the maintenance steering group (reference draft FAA Order 6000.27A). These findings should be used to develop a maintenance concept of the 1990's. Significant issues such as the number of CRF's, structured maintenance, relationship between LIS and MMS, etc., should be worked by an FAA/User/SEI Maintenance Steering Group(s).

Disposition: Accepted

The NAS Plan is updated annually and the next update will be published in April 1985. The maintenance summary information contained in Chapter 6 will be reviewed by the FAA/SEI contractor to assure it is in compliance with latest changes to draft Order 6000.27A.

Issues such as CRF's, structured maintenance, and the relationship between LIS and MMS, etc., are addressed in the 80's Maintenance Implementation plan (result of the workshop at Fredericksburg) and the National Airspace Integrated Logistics Support (NAILS) Program plan which are under development.

Recommendation 3: With the finalization of the maintenance concept definition, the system design requirements should be defined and allocated to the individual projects within the set. Design requirements for each project need to be defined to assure an integrated maintenance system evolves that is an integral part of the NAS system and supportive of the goals and objectives of the NAS Plan.

Disposition: Accepted

System design requirements for Maintenance and Operations Support are being allocated to individual projects in the Level I and II Design documents. The baselining of the NAS System Level I Design document to be followed by a more detailed design document, Level II Design, will assure an integrated maintenance system, supportive of the goals and objectives of the NAS Plan.

#### 4.12 DISPOSITION OF RECOMMENDATION FROM 6.2.12 - SURVEILLANCE PROGRAMS

Recommendation: To mitigate the potential risk, we recommend an acceleration of the agency-wide effort to coordinate, complete, and approve all National Network Plans now being developed. This will provide a baseline against which currently planned facilities and equipment quantities may be compared so that necessary changes can be effected by the individual projects on a timely basis. Any necessary adjustments to previously computed cost benefit ratios should be made and reflected in the next annual NAS Plan update.

Disposition: Accepted

The necessary work to develop network plans is progressing. Adjustments to the NAS Plan which reflect approved network plans will be made with the support of the SEI contractor.

#### 4.13 DISPOSITION OF RECOMMENDATION FROM 6.2.13 - WEATHER SYSTEM INTEGRATION

Recommendation: A working group should be established to complete the weather system design. The group should address the allocation of functions to weather system elements, the interfaces for each element, the methodology for use of NEXRAD data, weather system architecture issues, processing and display requirements, transition planning, development of a schedule including dependencies, and development of appropriate documentation for the total weather system.

Disposition: Accepted

The recommended working group was established in support of the preparation of the Level I design. This working group is addressing the above identified activities. The SEI contractor is tasked with supporting the activities of the working group.

#### 4.14 DISPOSITION OF RECOMMENDATIONS FROM 6.2.14 - COMMUNICATION SYSTEM INTEGRATION

Recommendation 1: A program plan should be prepared for a total integrated communications system. Transition and implementation planning in the program plan should be included, or separate transition/implementation plan(s) should be developed. The program plan should include all projects that comprise the integrated communications system network (VSCS, AAS/LCN, ICSS, TCS, Data Multiplexing, RML, TML, NADIN, and RCE), and should discuss the relationship of the NARACS in an integrated communications system. The NICS program plan should show how the goals stated in the NAS Plan flow down to specific projects and schedules. The NICS program plan will serve as a focus for all communications functions and will provide an integrated system approach. Specific objectives of the NICS program plan should be to:

- a) List all communications projects and describe functional relationships and hierarchies and projected communications flows;
- b) Provide an integrated transition and implementation plan that includes each NICS projects;
- c) Provide for a communications requirement data base;
- d) Provide for the development of interface control and protocol documents based on standards;
- e) Provide for the development and maintenance of integrated project schedule.

Disposition: Partially Accepted

The completed Level I Design and the Level II Design being prepared by the SEI contractor will adequately describe the plan for the integrated communications system. A separate program plan for the integrated communications system is not required. Related activities by the SEI contractor will be responsive to items a)-e) of the recommendation.

Recommendation 2: A needs analysis should be conducted and should be based on requirements input from all users of the integrated communications system. To aid in delineating user requirements, a communications system user requirements survey form should be developed that identifies all desired requirements data. The results of the needs analysis should be used to develop a data base for an integrated communications system.

Disposition: Partially Accepted

User surveys have already been conducted. With SEI contractor support, the available data will be reviewed to determine the need for further information.

Recommendation 3: System-level planning and user requirements should be incorporated into a detailed top-down integrated communications system design with the system-level specification. The specification should include the details of interface control and protocol document requirements derived from a comprehensive analysis of the connectivity of NAS Plan projects with the integrated communications system. This planning should recognize the current status of the various communications projects and address the means for an efficient integration into a total system. This effort would establish a common set, or family, of interfaces for user access and interconnectivity to the NAS.

Disposition: Accepted

Recommended work is being performed by the SEI contractor as part of Level I and II Design.

Recommendation 4: The transfer of the schedule data base from VISION to ARTEMIS should be expedited, and a vertically integrated schedule developed that will include the relationship/interdependence of the communications system projects and other NAS Plan projects.

Disposition: Accepted

The SEI contractor is currently tasked with transferring the VISION data base to ARTEMIS and baselining vertically integrated schedule data for all NAS Plan programs including communication system projects.

Recommendation 5: A backup and alternate communications networking policy should be expedited so that the need for Tandem Switching can be determined.

Disposition: Accepted

The backup communications requirements are being investigated with SEI contractor support as part of Level II design.

#### 4.15 DISPOSITION OF RECOMMENDATION FROM 6.2.15 - REMOTE MAINTENANCE MONITORING SYSTEM (RMMS) INTEGRATION

Recommendation: It is recommended that the RMMS system-level requirements, architecture, interface, and implementation planning be fully documented, reviewed, controlled, and approved as a priority item. The ongoing RMMS development efforts should continue as good concept definition data are being obtained. Production procurements for RMMS equipment should be gated to the approval of the system-level documentation identified above. Specific emphasis should be placed on providing RMMS interface information as early as possible to the various NAS subsystems being procured to minimize potential retrofit cost impacts. This system level effort should be the responsibility of AES and the SEI contractor.

Disposition: Partially Accepted

The actions identified are currently ongoing with the participation of AES-100/200/400, APM-100/600, the Remote Maintenance Monitoring Steering Group (RMMSG), and the SEI contractor. This cooperative effort should not be changed.

Examples of ongoing efforts in this area include:

1. Preparation of the NAS Requirements Document and NAS Level II design. These documents will define the total NAS system requirements and define the basic NAS elements, facilities, equipment, and their interrelationships. The Level II Design effort is started and will provide the next level of detail for the overall NAS.
2. Preparation of NAS-MD-790, Interface Control Document for the Remote Maintenance Monitoring System (RMMS). This document has been revised to conform to the RMMS architecture and is now baselined. This document defines the electrical, mechanical, and data link control and interface requirements for Maintenance Processor Subsystem (MPS) to Remote Maintenance Subsystem (RMS) data communications to insure proper operation of the RMMS.
3. Preparation of operational requirements for the Remote Maintenance Monitoring System (RMMS). This document is currently being updated with the assistance of the SEI contractor, based on the revised RMMS architecture and in accordance with the concepts in draft Order 6000.27A. When completed, it will be controlled via the configuration management process.
4. Preparation of Remote Monitoring Subsystem Functional Description. This document allocates functional requirements to the RMS. When completed, it will be controlled via the configuration management process.
5. The above documents are binding on FAA program managers during the development of procurement specifications. In addition, a System Implementation Plan is under development by the APM RMMS Program Manager.



#### 4.16 DISPOSITION OF RECOMMENDATIONS FROM 6.2.16 - PRIMARY RADAR COVERAGE.

Recommendation 1: The requirement for en route search radar coverage is specifically stated by Air Traffic. It is felt that there is, potentially, some relief from this on a CONUS-wide basis. This is based on the fact that in high-altitude regions the requirement is a shallow coverage depth and, in fact, radar data may not be used or practical because of clutter. Other regions may have a so little traffic that it is not warranted. The recommendation, in part, is to challenge the requirement on a regional basis.

Disposition: Partially Accepted

The FAA is currently conducting a study to determine the number of Long Range Radars (LRR's) required to satisfy air traffic requirements as part of the National Surveillance Network. During this year's update of the NAS Plan, with the participation of the SEI contractor, FAA will determine the implications of the network study on NAS Plan costs and benefits. If the number of LRR's required for the National Surveillance Network proves to be prohibitive in terms of costs, we will review the air traffic en route coverage requirements on an area-by-area basis with the goal of providing the number of radars necessary for flight safety.

Recommendation 2: Consideration of a measurement on existing radars of the actual coverage that can be obtained in high-altitude region at the MEA to FL200. The basis for this is that the radar is a line-of-sight device and the low altitude coverage can be difficult to meet, i.e., there may be regions where the MEA to FL200 requirement cannot, in a practical sense, be met.

Disposition: Accepted.

The recommended work is being accomplished as part of the radar network planning with radar coverage analysis support from the SEI Contractor.

## 5.0 NAS PLAN PROJECT FINDINGS

The SEI contractor conducted detailed audits on each of the 88 NAS Plan projects. Their overall assessment of the projects indicates that they are within the state-of-the-art and technically and programatically sound. A total of 152 NAS Plan project specific recommendations were made. The majority of these recommendations focus attention on the need for strong program/project management and project and system engineering. Of the 152 recommendations made, 145 are fully accepted or partially accepted by the FAA. Many of the accepted or partially accepted recommendations have previously been recognized by the FAA. The implementation of the types of recommendations contained in the audit report is one of the prime reasons for issuance of the SEI contract. The seven recommendations rejected by the FAA involve: 1) the consolidation of the TML/RCL, AERA 2/3 and TMS Phase III projects, 2) formation of an ICD working group for ARTS II/ASR-9/MODE-S interface development and validation, 3) procurement strategies for AWOS and VSCS and 4) the termination of Mitre support activities for AERA I. Each of the rejected recommendations has been so dispositioned based upon the judgement that they are not advantageous.

#### 5.1.11 DISPOSITION OF RECOMMENDATIONS FROM 6.3.1.13 - AERA

Recommendation 1: AT has recently issued an order for AERA 1 requirements. The FAA is now preparing an AERA 1 specification update to reflect the order. After the update has been coordinated and accepted by the AAS CCB, the AAS contract will be modified. Consequently, all Mitre effort associated with the development and testing of AERA 1 can be terminated.

Disposition: Rejected

MITRE has been contracted to prepare the algorithm specification for AERA I. This work is nearing completion and will be coordinated with the AAS CCB. The need for additional Mitre involvement in AERA I development and testing will be reviewed and addressed by AERA Executive Committee (EXCOM) which is supported by the SEI contractor.

Recommendation 2: Effort should be initiated immediately to develop a strawman A specification of the AERA 2 functions.

Disposition: Accepted

During FY 1985/1986, FAA will prepare a final AERA II A-Level Specification. A draft of this specification will be available by the end of September 1985. In support of the preparation of this specification, we are preparing a high level AERA II concept document for use by the AERA Controller Advisory Team (ACAT). Over the next year, we plan to use this team as a mechanism for refining the AERA II specification.

FAA believes that the product that is produced by this process will be substantially better than a strawman A-Level specification. In fact, it will result in a document usable for AAS acquisition.

Recommendation 3: A multidisciplined team representing all applicable organizations should be formed (similar to the existing Sector Suite Requirements Validation Team) with the charter to establish and document the development, procurement, and implementation strategy of AERA 2/3 and TSM Phase III (i.e., produce a program plan).

Disposition: Partially Accepted

An AERA Executive Committee (EXCOM) has the initial goal of reviewing the role of the AERA testbed and development process. Once this reviews is completed, the AERA EXCOM will focus its attention on the longer range development questions contained in the recommendation.

Recommendation 4: Analyze the new VSCS schedule for compatibility with the AAS schedule. In particular, potential impact to the "ISSS evaluation at FAA Technical Center" span time should be assessed in view of dual VSCS evaluation.

Disposition: Accepted

AAP has a close working relationship with the VSCS Program Office and they jointly review and analyze VSCS schedule changes whenever they occur. There is a formal Memorandum of Understanding that lays out the explicit interaction between the two programs throughout the acquisition cycle.

Recommendation 5: Perform contingency planning as a part of the ACF project to supplement the effort by the AAS DCP competitors in looking at the impact of the possible eventuality of TRACON's not being consolidated into the ACF.

Disposition: Accepted

FAA has considered the recommendation and concluded:

1. Not to change the AAS Specification;
2. To require AAS contractors to show how the AAS design could be modified to provide this capability; and
3. To establish, at the NAS level, a Terminal assessment/planning activity to monitor AAS, ACF, and ARTS II/III programs and develop any necessary contingency plans to ensure that effective terminal services can be provided.

5.1.10 DISPOSITION OF RECOMMENDATIONS FROM 6.3.1.12 - ADVANCED AUTOMATION SYSTEM

Recommendation 1: Continue the AAS working group activities beyond the NAS Level 1 Design baselining. The charter should be expanded and be the single focal point for AAS external interfaces to other projects as well as NAS design activities (Levels II, III, IV, and standards). This should also include participation of AAS working group members on other parallel working groups such as Weather, TMS, etc.

Disposition: Accepted

FAA agrees with the need to extend the activities of the AAS Working Group and with the desirability of having a single focal point for interfaces within and outside the AAS. The charter of the AAS working group will be appropriately modified.

Recommendation 2: Establish a single operational team which supports both the Sector Suite and the VSCS panel design/development activities. This team should consist of some mix of the current SSRVT and VSCS ORT. The team's involvement in both procurements should include, as a minimum, the establishment of specific man-machine interface requirements/guidelines, monitoring of contractor design documentation, attendance at appropriate technical reviews, and involvement in tests/evaluations of mockups and prototype equipment.

Disposition: Accepted

FAA agrees that there is an inherent risk in achieving man-machine interface compatibility in the current AAS/VSCS approach. The SSRVT and the VSCS program office (including the VSCS requirements team and JPL, the VSCS system engineer) have been coordinating the initial requirements and interface definitions.

Recommendation 3: Provide a change summary package (with Change #8) to the DCP contractors that provides more detail on change rationale and interpretation of new/change requirements. This document should decrease RFA traffic and help reduce the schedule risk associated with completion of SRR.

Disposition: Accepted

We assume this recommendation relates to Mod 1 of the contract, not to draft amendment 8, which was an internal working document. We agree fully with the intent of the recommendation, although it is expected that a detailed rationale will be needed on only a few of the changes. In recognition of this concern, we will hold technical interchange meetings with IBM and Hughes to present and discuss the rationale for major changes. In addition, we have put in place an organizational structure for AAP and its support contractors to provide full and timely responses to any remaining RFA's from Hughes and IBM.

5.1.9 DISPOSITION OF RECOMMENDATIONS FROM 6.3.1.11 - VOICE SWITCHING AND CONTROL SYSTEM

Recommendation 1: The VSCS Operational Requirements Team effort should be combined with the Sector Suite Requirements Validation Team and the Transition Requirements Validation Team so that a common assessment is made of both the sector suite console and VSCS panel.

Disposition: Accepted

We accept the recommendation that the VSCS Operational Requirements Team effort be closely coordinated with the Sector Suite Requirements Validation Team (SSRVT) and the Transition Requirements Validation Team.

Recommendation 2: Select a procurement strategy and contractual vehicle supported by a Prime Item System Development (B-1) specification of requirements.

Disposition: Rejected

We reject the recommendation to change the VSCS specification from the FAA-STD-005 format to the MIL-STD-490 format because it would result in a VSCS program delay. We have carefully reviewed MIL-STD-490 and have taken action to insure that the VSCS specification contains all the specification items required by MIL-STD-490.

Recommendation 3: Modify the VSCS procurement strategy to a dual competition phase through CDR and select a single contractor for production phase.

Disposition: Rejected

This recommendation has been considered and rejected by the FAA. The VSCS procurement will proceed as a dual competition through first article with the option to down select to one contractor at any time.

5.1.8 DISPOSITION OF RECOMMENDATION FROM 6.3.1.10 - CONFLICT ALERT IFR/VFR  
MODE-C INTRUDER

Recommendation: Close attention must be given to the algorithm/parameter aspect to assure an operationally acceptable level of false alarms.

Disposition: Accepted

Development of conflict alert enhancements to reduce the number of false alarms is now underway. The completion of development and testing is projected for late 1985 or early 1986.

5.1.7 DISPOSITION OF RECOMMENDATION FROM 6.3.1.9 - CONFLICT RESOLUTION  
ADVISORY

Recommendation: FAA should formulate policy for the use of CRA in IFR/VFR conflicts before the CRA operational evaluation. Existing CRA requirements should then be reviewed for compatibility to facilitate operational evaluation.

Disposition: Accepted

Air Traffic control policies are formulated by AAT and documented in manual ATP 7110.65. APM will coordinate with AAT to establish required changes in policy prior to operational evaluation.



#### 5.1.6 DISPOSITION OF RECOMMENDATION FROM 6.3.1.8 - EN ROUTE METERING-II

Recommendation: Review the requirements of ERM-II in the context of functional capabilities of ERM-1A.

Disposition: Accepted

The FAA with the support of Mitre corporation has completed a review in this context. In 1985, the FAA has initiated a three phased improvement program for the NAS ERM function. They are:

- 1985 - Automation of the En Route spacing operation.
- 1986 - Metering enhancements, manual coordination with upstream centers and interface with the Central Flow Control function.
- 1988 - Full metering capability, automated coordination with upstream centers, advisories to sector controllers on how to absorb delays.

Recommendation 4: Capacity requirements for En Route Metering-II, Conflict Advisory, and Conflict Alert IFR/VFR Mode-C Intruder Software should be baselined and tracked in relation to the Host software development effort.

Disposition: Accepted

The MSPE has an on-going effort to assess capacity requirements for the above Host Software (S/W) development effort, as well as all other software enhancements, including new NAS releases (after 3d2.14). Preliminary sizing estimates for the above S/W developments and other enhancements are now being refined to increase their accuracies within the MSPE models. New Host load tapes are being prepared to verify the 50% utilization requirement for 1995 workloads. These tapes will be used as inputs to a discrete-event simulation which has been modified for the increased speeds of the new Host DCP computers and will contain models of all latest software developments. The MSPE will continue to track the capacity requirements of future S/W refinements and S/W developments (e./g., post-host enhancements) throughout the life of the Host system.

Recommendation 5: Project schedule for the Host and Host compatibilities among Host, FDIO, and E-DARC should be tracked quarterly to define any changes and to determine appropriate corrective action.

Disposition: Accepted

AAPO is tracking the progress of FDIO and of DARC and is assessing the potential impact changes of FDIO and DARC schedules on the Host programs.

Recommendation 3: Particular emphasis should be placed on the capacity margins actually being gained versus the predicted capacity margins. Budgets should be assigned to measurement parameters associated with storage, throughput, and timing. The current performance monitor software should continue to be analyzed to assure its integrity and viability to provide capacity measures. If deficiencies are found, then studies should be performed to determine the cost effectiveness of implementing additional software monitor routines to assure the measurement of data integrity. As a minimum, monthly technical reviews of the capacity margins should be planned. The FAA's Modeling and Simulation Program Element (MSPE) addresses the Host computer in these capacity areas. We recommend that the MSPE activity be expanded to include all components of the Host system. This extension should identify system margin and response times actually delivered and should predict system margin and response times with various enhancements added.

Disposition: Partially Accepted

FAA agrees that emphasis should be placed on system capacity margins. AAPO has performed an evaluation of both Host design competition phase (DCP) contractor's extensive resource monitoring improvements now nearing completion. These improvements include on-line monitoring of processor, channel, storage, peripheral, and program element utilizations along with monitoring of OP code, interrupt, and software category change executions. The MSPE has also completed the development of post-processing tools to improve the measurement of Host response times, I/O channel utilizations, and program element service times. The resource monitoring improvements and the new tools will provide adequate measurement of data integrity for the assessment of system capacity.

FAA does not agree that monthly technical reviews of capacity are necessary. Quarterly technical reviews should be sufficient to cover the system capacity margins needed to accommodate future workload increases and improvements to the NAS en route system. The MSPE will have the tools in place for the measurement, analysis, and prediction to carry-out these reviews as data becomes available from the Host acquisition contractor and quarterly after the Host system becomes operational. Special reviews outside of the quarterly schedule, such as the planned implementation of conflict resolution advisories and en route metering II, can be conducted on a one-by-one basis when they are needed.

FAA does not believe it is appropriate to model all of the components of the Host system. Components which have long message processing times (e.g., the times from start I/O to end-of-message for flight strip printers) and those which do not significantly vary with the en route center's workload (e.g., the PAM and the interfacility communications) will not be dominant contributors to the analysis of capacity margins. The MSPE is now addressing the modeling and measurement of the display channel computers to gain greater insight to its message processing delays at high traffic loads.

#### 5.1.5 DISPOSITION OF RECOMMENDATIONS FROM 6.3.1.7 - HOST COMPUTER

Recommendation 1: Since the Host computer system is an essential first step in meeting the NAS plan goals (capacity and maintainability), it is necessary to assure that the Host computer system is installed and made operational at the 20 sites on schedule. To assure this, detailed planning and coordination are necessary and should include contingency and backup/recovery plans to avoid unnecessary delays. Key aspects are (1) starting the acquisition phase on schedule, (2) assuring the 20 sites are ready to accept the new Host, and (3) meeting the site installation schedules.

Disposition: Accepted

The request for proposals (RFP) was released for bidding purposes in December 1984. Contract award is scheduled for July 1985. The activities involved in expanding the ARTCC buildings are well underway. Initial site surveys have been completed at all sites. Building construction at the first site (Seattle) is also underway and scheduled for completion on October 1985. Initial Host equipment delivery is scheduled for April 1986. Advanced automation program office (AAPO) has provided 6 months of slack time for final site preparation and contingency activities for each field facility. The equipment installation schedule has been developed, and coordination of the dates specified for equipment installation, acceptance, and operational readiness has been accomplished with the operating services. This information has been provided to the two prime contractors with every indication that the schedule can and will be met. The concerns expressed in the recommendation are shared by the FAA and the AAPO program management emphasis has been to track all of these activities very closely.

Recommendation 2: Reconsider the Host software test philosophy. The current plan indicates that FAA Technical Center Host software testing will terminate at the beginning of Site 1 installation. A tradeoff analysis should be performed to determine the benefits and cost/schedule impact of expanding the FAA Technical Center test activities to include site specific testing prior to the site specific software delivery and concurrent with site specific hardware installation. (See Figure 6.3-1). This will allow for additional testing at the FAA Technical Center without impacting the site installation schedule and would minimize the number of problems encountered in the field.

Disposition: Accepted

AAPO has initiated an analysis of a proposal for significant additional testing at the FAA Technical Center. The proposal entails site specific testing with the prime objectives of minimizing the number of problems that might be encountered at field sites and increasing the confidence in the reliability of the Host Computer System before making it operational at the early field sites. A cost/benefit analysis resulted in the directed effort to develop a Host computer system acquisition phase reliability/maintainability/availability plan to ensure that required testing activities were planned and completed.

#### 5.1.4 DISPOSITION OF RECOMMENDATIONS FROM 6.3.1.6 - TRAFFIC MANAGEMENT SYSTEM

Recommendation 1: Ensure close coordination and requirements continuity between the Phase II and Phase III project offices.

Disposition: Accepted

The need for close coordination and requirements continuity between the Phase II and Phase III project offices has been recognized by the FAA. The en route automation program office intends to establish closer ties between the two offices within the next few months.

Recommendation 2: Combine TMS Phase III with AERA-2/3 into a single project. The new project would become a block upgrade to AAS.

Disposition: Rejected

The consolidation of TMS Phase III with AERA-2/3 was considered by the FAA and deemed unfavorable. The resulting consolidation if it were to occur would increase the technical complexity and cost and delay the implementation of the two projects.

5.1.3 DISPOSITION OF RECOMMENDATIONS FROM 6.3.1.5 - OCEANIC DISPLAY AND PLANNING SYSTEM

Recommendation 1: Expedite the decision relating to the IBM 4341 versus the IBM 4381 as the main processor and provide funding increases as necessary.

Disposition: Accepted

The decision has been made to use the IBM 4381 for ODAPS. Sources for funding increases are being investigated as necessary.

Recommendation 2: Perform a technical/operational analysis to verify the planned incorporation of ODAPS into the future AAS.

Disposition: Accepted

The SEI contractor is conducting a technical/operational analysis to verify the planned incorporation of ODAPS into the future AAS. This analysis will be completed by April 1986.

5.1.2 DISPOSITION OF RECOMMENDATION FROM 6.3.1.3 - ENHANCED DIRECT ACCESS  
RADAR CHANNEL (E-DARC) SYSTEM

Recommendation: The schedule adjustment relating to the new E-DARC software functions as they impact the Host Computer project should be ascertained.

Disposition: Accepted

Site Program Bulletin (SPB), SPB-DAC-066, published in May 1984 gives the new delivery schedule for E-DARC software. This schedule shows key site testing in mid June 85 and operational changeover for all sites by the end of June 1985. The contractor's progress in implementing the required changes has been more rapid than expected, and it is probable that the software will be operational before that time. 9020/E-DARC Software will be available in 6/87. No impact on the Host computer project is envisioned.

## 5.1 DISPOSITION OF EN ROUTE SYSTEMS RECOMMENDATIONS

### 5.1.1 DISPOSITION OF RECOMMENDATIONS FROM 6.3.1.2 - FDIO

Recommendation 1: Plans for limiting the impact of simultaneous operations during transition should be prepared.

Disposition: Accepted

An Implementation Plan is being prepared for FDIO and a copy will be provided to SEI contractor.

Recommendation 2: Close monitoring for schedule compliance during both the production and installation phases must be maintained because of obvious risk implications.

Disposition: Accepted

Major procurement and installation milestones for the FDIO program are being monitored by the program office.



Recommendation 4: The selected acquisition phase AAS contractor should be required to accommodate an interface with AERA 2/3 functions to help simplify the eventual integration of AERA 2/3 into AAS.

Disposition: Partially Accepted

Section 6.3 of the AAS Specification contains a high level description of the future automation capabilities required to meet the full objectives of the NAS Plan. AAS Design Competition Phase contractors are required to submit plans on how their system designs will accommodate AERA-2 features and what their transition strategies would be.

FAA believes that it is desirable to give the AAS contractors a strong incentive to provide for the AERA 2 features. Accordingly, it has been proposed that an AERA-2 A-Level specification be used in the development of the AAS acquisition phase (AP) RFP. This makes the AAS AP contractor responsible for developing the B-level specification and eventual implementation of AERA 2. This strategy is being reviewed in detail by AAP along with AES to establish feasibility.

5.1.12 DISPOSITION OF RECOMMENDATIONS FROM 6.3.1.15 - AREA CONTROL FACILITIES (ACF)

Recommendation 1: An ACF program team, including a permanent ACF program manager, should be put in place as rapidly as possible.

Disposition: Accepted

The FAA agrees to the formation of a permanent ACF program team with an associated program manager.

Recommendation 2: An improved interface between the ACF Implementation Plan and the NAS Design and implementation cycle must be established.

Disposition: Accepted

The organizations within the FAA are investigating ways of improving the interfaces between NAS design efforts and ACF implementation planning.

Recommendation 3: A more comprehensive ACF development and implementation master schedule and supporting project schedules suitable for use by the ACF program manager as baselines for managing and achieving the objectives of the ACF implementation program must be established.

Disposition: Accepted

The SEI contractor has been tasked to develop a hierarchy of schedules from the program master schedule down to the project schedule for all NAS plan projects. These schedules will be used by FAA personnel for managing and achieving the objectives of the ACF program.

Recommendation 4: An independent, detailed audit of the ACF project implementation plan should be undertaken along the lines of the NAS Level I Design Audit, including a reassessment of the Honolulu and Anchorage ARTCC's and the New York TRACON to determine their operational capacities through full ACF implementation.

Disposition: Accepted

FAA recognizes the need to review planning for all phases of the ACF program because of its complexity and the need for successful integration of many projects. The SEI contractor is responsible for assuring that the details of ACF implementation planning are accurately documented. The review would include a reassessment of Honolulu and Anchorage ARTCC's and New York TRACON to determine their operational capabilities through full ACF implementation.

## 5.2 DISPOSITION OF TERMINAL SYSTEMS RECOMMENDATIONS

### 5.2.1 DISPOSITION OF RECOMMENDATION FROM 6.3.2.1 - ARTS-III ENHANCED TERMINAL CONFLICT ALERT

Recommendation: Detailed planning between APM and the ATS needs to be completed at the earliest possible time with reference to the installation/deployment portion of this project.

Disposition: Accepted

Planning for the installation and deployment of ARTS-III Enhanced Terminal Conflict Alert has been accomplished. Dates for installation/deployment have been agreed upon by the responsible FAA organizations.

### 5.2.2 DISPOSITION OF RECOMMENDATIONS FROM 6.3.2.3 - ETG DISPLAY (ARTS-III)

Recommendation 1: Since this is a new competition, the procurement process should be monitored for cost and schedule performance, particularly if the decision is made to use D-BRITE displays.

Disposition: Accepted

The terminal automation program office is monitoring the full digital ARTS III display (FDAD) competitive procurement process. This effort is also supported by the SEI contractor which is developing the necessary program management tools for all programs within the NAS.

Recommendation 2: The decision to proceed with either the FDAD or D-BRITE systems must be made soon to preclude schedule slippage.

Disposition: Accepted

FDAD type displays are being considered for use in New York TRACON. This will allow the existing New York TRACON verticals for possible use as ETG controller trainee displays. Also being considered is the use of D-BRITE for for ETG pilot display.

Recommendation 3: Integration of the two programs (2-03 and 2-16) should be considered if the decision is in favor of D-BRITE.

Disposition: Accepted

The FAA is currently considering the viability of using D-BRITE for ETG pilot positions.

### 5.2.3 DISPOSITION OF RECOMMENDATION FROM 6.3.2.4 - ADDITIONAL ARTS-IIIA MEMORY

Recommendation: An analysis concerning terminal automation system upgrades should be undertaken.

Disposition: Accepted

Terminal automation system upgrades are in progress. The terminal automation program office has additional ARTS-IIIA memory under contract and is tracking the procurement.

#### 5.2.4 DISPOSITION OF RECOMMENDATION FROM 6.3.2.6 - ARTS-IIA ENHANCEMENTS

Recommendation: The testing program should be closely monitored so that potential processor capacity and cost/schedule impacts are immediately identified and corrective action initiated.

Disposition: Accepted

The terminal automation program office is closely monitoring ARTS-IIA program testing for any potential design problems which may impact program cost and schedule. A program structure is in place which will allow for immediate identification of problems and its associated corrective action.

#### 5.2.5 DISPOSITION OF RECOMMENDATIONS FROM 6.3.2.9 - ARTS II INTERFACE WITH MODE-S/ASR-9

Recommendation 1: The FAA-SEI team needs to track the technical adequacy and completeness of each Mode-S/ASR-7/8/9 ICD. This should commence with tracking Mode-S/ASR-9 interface details that are forthcoming from APM.

Disposition: Partially Accepted

FAA-SEI teams have been established to provide technical support for both the MODE S and ASR-9 programs. As part of this effort, these teams will review MODE S/ASR-7/8/9 interfaces and the technical adequacy of ICDs developed by the MODE-S and ASR-9 program offices. We do not believe that an additional organizational element separate from the one currently in place is warranted.

Recommendation 2: Software development should be tracked as an area of concern from an initial development, field implementation, and system integration viewpoint.

Disposition: Partially Accepted

The ARTS-II interface with MODE S/ASR-9 has been established. Software development associated with this interface will be tracked by the program office from development through system integration and commissioning. FAA-SEI teams have been established to provide technical support to both the MODE S and ASR-9 programs.

Recommendation 3: The FAA-SEI team needs to track the Mode-S schedule as a key dependency and also to track ASR-9, ASR-7/8 and ARTS-II schedules.

Disposition: Accepted

The FAA recognizes the need to track the ASR-9, ASR-7/8, MODE S and ARTS-II schedules as part of the overall effort of integrating new equipment into the NAS system. This activity will be supported to a large degree by the SEI contractor.

Recommendation 4: A detailed review of the cost aspect is required.

Disposition: Partially Accepted

Cost associated with the ASR-9/MODE S/ARTS interfaces has been established. Much of this work is currently under contract. As part of the FAA/SEI contractor activity to update the NAS Plan all project cost will be validated. We do not believe that a detailed review of interface cost over and above the work being performed is warranted.

Recommendation 5: The methodology recommended for accomplishment of these recommendations is the formation of an ICD working group. This project should be scrutinized as part of a general effort to look at "control of NAS project interfaces." An ICD working group could provide a major portion of this scrutiny as well as establishing a vehicle for disciplined configuration control for each interface.

Disposition: Rejected

A separate, new working group to be responsible for interface activities is not necessary and would overlap with existing responsibilities and procedures.

The Level I Design document, baselined in October 1984 with support from the SEI contractor, identifies all system interfaces. For each system interface, formal Interface Control Documents (ICD's) are required and are being produced by the responsible program managers. In addition, a configuration management process supported by the SEI contractor has been established to control any proposed changes which affect system interfaces.



5.2.6 DISPOSITION OF RECOMMENDATION FROM 6.3.2.10 - AUTOMATIC TERMINAL  
INFORMATION SERVICE (ATIS) RECORDERS

Recommendation: The effect of a combined ATIS/HIWAS procurement should be reviewed for impact on unit costs and schedules.

Disposition: Accepted

As part of the FAA/SEI contractor activity to update the NAS Plan, all project costs and schedules will be validated.

5.2.7 DISPOSITION OF RECOMMENDATIONS FROM 6.3.2.11 - Multichannel Voice Recorders

Recommendation 1: The quantities of ATCT/FSS recorders to be procured and procurement cost estimates should be made consistent.

Disposition: Accepted

The quantities of ATCT/FSS recorders to be procured will be reviewed by the FAA/SEI contractor during the NAS Plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT, and OMB will be incorporated in the 1985 edition. This process will establish the cost and quantities to be used for the ATCT/FSS recorder procurement.

Recommendation 2: The NAS Plan should be revised to reflect a realistic schedule for ARTCC/ACF recorder procurement on a projected availability data of June 1986 for the specification.

Disposition: Accepted

The ARTCC/ACF recorder project will be reviewed by the FAA/SEI contractor during the NAS Plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT and OMB will be incorporated in the 1985 edition..

Recommendation 3: The FAA should solicit advice from potential suppliers during the preparation of the specification.

Disposition: Accepted

As part of FAA's specification development process for the ARTCC/ACF recorder procurement, we will solicit comments from offerors of recorder equipment.

5.2.8 DISPOSITION OF RECOMMENDATION FROM 6.3.2.12 - TOWER COMMUNICATION SYSTEM (TCS)

Recommendation: The TCS technical requirement and associated schedules and cost aspects should be evaluated in the future in the context of the VSCS program development.

Disposition: Accepted

FAA accepts the recommendation to evaluate the technical/schedule/cost aspects of the TCS in the context of the VSCS Program development.

5.2.9 DISPOSITION OF RECOMMENDATION FROM 6.3.2.13 - ATCT/TRACON ESTABLISHMENT, REPLACEMENT, AND MODERNIZATION

Recommendation: A reassessment of the scope and schedule aspects of this project should be performed in the context of the modernization/relocation policy and handbook.

Disposition: Accepted

FAA accepts the recommendation to perform a reassessment of the scope, schedule, and cost aspects of this project in the context of the modernization/relocation policy and handbook.

The modernization/relocation handbook is designed to provide a uniform basis for identifying such efforts. Air Traffic Service is responsible for validation of major projects to establish, relocate, or decommission an ATCT or TRACON facility. The handbook will be used for review and validation of the FY 1987 regional submissions.

#### 5.2.10 DISPOSITION OF RECOMMENDATIONS FROM 6.3.2.14 - VFR ATCT CLOSURES

Recommendation 1: Consideration should be given to removing this project from the NAS Plan. Any future opportunities for tower closures could be addressed on a case-by-case basis as they meet criteria and are identified by the regions.

Disposition: Accepted

The VFR ATCT closure project will be reviewed by the FAA/SEI contractor during the NAS Plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT, and OMB will be incorporated in the 1985 edition.

Recommendation 2: The benefits attributed to the freeing-up of some 200 Air Traffic Service positions should be reassessed in view of the current direction of this project.

Disposition: Accepted

The benefits associated with VFR ATCT closures will be reviewed by the FAA/SEI contractor as part of the NAS Plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT and OMB will be incorporated in the 1985 edition.

5.2.11 DISPOSITION OF RECOMMENDATION FROM 6.3.2.15 - COMBINE RADAR APPROACH  
CONTROL INTO ARTCC

Recommendation: This project should be reviewed carefully to determine whether future TRACON/ARTCC consolidations are likely to occur prior to implementation of the ACF concept. If such consolidations are not likely, it is recommended that this project be dropped from future editions of the NAS Plan.

Disposition: Accepted

This project will be reviewed by the FAA/SEI contractor during the NAS Plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT and OMB will be incorporated in the 1985 edition.

5.3.10 DISPOSITION OF RECOMMENDATION FROM 6.3.3.10 - RADAR REMOTE WEATHER  
DISPLAY SYSTEM (RRWDS)

Recommendation: The FAA should investigate the potential to upgrade the flexibility of the RRWDS to be more useful at the workstation.

Disposition: Partially Accepted

A requirements process is being established to review proposed changes to the National Airspace System. Future new requirements will be subject to rigorous system engineering analysis to determine costs, benefits, and required schedules. These analyses will be heavily supported by the SEI contractor. The determination to accept substantial new requirements as part of the NAS Plan, however, requires additional monetary resources for both contractual and operations and maintenance costs.

The benefits and costs for the new NAS Plan project requirements identified by the SEI contractor will be established during the NAS Plan update process. If approved by the NAS Plan EXCOM, the Administrator, the DOT and the OMB, they will be incorporated in the 1985 edition of the NAS Plan.

Recommendation 4: The strategy for locating and selecting the appropriate radio transmitter for distribution of AWOS information to pilots should first include a site specific survey. Some guidelines for selecting the strategy are as follows:

- ) Primary distribution through VHF discrete transmitter.
- ) Secondary distribution through the VOR serving the airport as the primary approach aid. The TVOR is preferred because it is collocated at the airport. VOR's greater than approximately 10 nm from the AWOS airport should be eliminated from selection because of decreasing signal strength.
- ) Clustering of AWOS data from more than one airport should be primarily transmitted over a centrally located VHF discrete transmitter and secondarily over a VOR. For safety and time constraints, a maximum of two AWOS stations transmitting data from one facility is recommended.
- ) AWOS voice over the NDB should not be considered because of FCC restrictions on low frequency voice bandwidth and on voice transmissions on NDB's.

Disposition: Partially Accepted

The FAA is currently conducting a frequency study to determine the availability of VHF channels for broadcasting AWOS voice data. We believe guidelines and strategy for locating and selecting the appropriate radio transmitter for distribution of AWOS information should be based on this frequency study. Until this study is completed, no recommendation as to selection of AWOS voice outlets should be made. With respect to the use of NDB for AWOS on a near-term basis, this should not be totally disregarded at this time.



#### 5.3.9 DISPOSITION OF RECOMMENDATIONS FROM 6.3.3.9 - AWOS

Recommendation 1: The NAS Plan should be updated to accommodate/clarify the selected acquisition strategy and schedule the number of systems to be deployed and the related projects/activities.

Disposition: Accepted

The AWOS program will be reviewed by the FAA/SEI contractor during the NAS Plan Update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT, and OMB will be incorporated in the 1985 edition.

Recommendation 2: The planned acquisition of two different AWOS designs and the required duplicate logistics support should be reconsidered. The FAA should procure the AWOS design and engineering data and require both production contractors to produce and install equipment to identical design and engineering data.

Disposition: Rejected

The FAA has reconsidered the planned acquisition of two different AWOS designs and rejected the idea that FAA should procure AWOS design and engineering data and require both production contractors to build to an identical engineering design. The FAA procurement approach for AWOS is based on the need to stimulate competition, to achieve an acceptable implementation rate and to ensure program success. The SEI contractor approach presents a high degree of risk as FAA would have to procure and validate the detailed engineering design and manufacturing package.

Recommendation 3: The FAA should accomplish a cost-benefits analysis for towered airports to serve as the basis for selecting towered airports to receive AWOS and provide the same level of justification as developed for untowered airports.

Disposition: Accepted

A cost effectiveness of towered locations has been determined. This determination is based on the assumptions that: (a) towered airports are controlled zones which by definition require weather observations, and (b) obsolete or incomplete weather sensor package equipment which currently exists has to be replaced.

5.3.8 DISPOSITION OF RECOMMENDATIONS FROM 6.3.3.8 - HAZARDOUS IN-FLIGHT  
WEATHER ADVISORY SERVICE (HIWAS)

Recommendation 1: Controls should be implemented to ensure that the current testing program is completed in a timely manner to preclude further project slippage and to take advantage of any feasible economies to be gained through a combined equipment buy with the ATIS project.

Disposition: Accepted

The HIWAS Project is being closely monitored by APM. Current testing of the HIWAS equipment is proceeding on schedule. In addition, the SEI contractor has been tasked to develop and implement controls for all NAS Plan projects to preclude any project slippage which may occur.

The FAA is also considering a combined HIWAS/ATIS procurement. As part of the FAA/SEI contractor activity to update the NAS Plan, the feasibility of economies to be gained through a combined equipment buy with ATIS will be determined.

Recommendation 2: Available funding should be reviewed to ensure that the fiscal year slippage has not affected spending authorization.

Disposition: Accepted

Available funding has been reviewed. Program slippage has not affected spending authorization.

5.3.7 DISPOSITION OF RECOMMENDATION FROM 6.3.3.7 - HIGH ALTITUDE EFAS  
FREQUENCIES

Recommendation: The nationwide frequency allocation study should be expedited and the schedules reviewed to reflect the anticipated study completion date. As soon as the results of the study are available, the project cost should be reviewed to ensure that they accommodate the required number of outlets.

Disposition: Accepted

The FAA has developed a frequency assignment plan for high altitude EFAS. This project is being engineered according to that plan.

5.3.6 DISPOSITION OF RECOMMENDATION FROM 6.3.3.6 - INTERIM VOICE RESPONSE SYSTEM (IVRS)

Recommendation: IVRS funding and operations schedule should be carefully reviewed to ensure that it is not terminated prematurely.

Disposition: Accepted

FAA agrees that the IVRS service should not be terminated before the VRS service is made operational. APM will take appropriate action to ensure the continuity of this important service. Review of IVRS funding and operations schedule will be performed on an annual basis.

5.3.5 DISPOSITION OF RECOMMENDATION FROM 6.3.3.5 - WEATHER COMMUNICATIONS  
PROCESSOR (WCP)

Recommendation: It is recommended that further planning efforts be delayed, subject to the working group recommendations for WCP functional requirements.

Disposition: Accepted

FAA agrees that detailed project activity, e.g. specification development, be delayed, subject to the working group recommendations for WCP functional requirements.

5.3.4 DISPOSITION OF RECOMMENDATION FROM 6.3.3.4 - WEATHER MESSAGE SWITCHING  
CENTER REPLACEMENT (WMSC-R)

Recommendation: WMSC-R interface planning and documentation requirements pertaining to other NAS Plan projects must be resolved prior to SRR.

Disposition: Accepted

FAA agrees with the recommendation. The System Requirements Review (SRR) for WMSC-R will be held in two parts. The first part of the review will cover operational requirements and the potential for using off-the-shelf hardware and software and will proceed as presently planned. The second part of the review will cover the preliminary system specification, interface control documents, and supporting system studies (including life cycle support cost). The critical interface which required additional documentation prior to this part of the SRR is with NADIN II. Consequently, this portion of the SRR will be scheduled to follow the completion of the draft NADIN II specification.

5.3.3 DISPOSITION OF RECOMMENDATIONS FROM 6.3.3.3 - CONSOLIDATED NOTAM SYSTEM (CNS)

Recommendation 1: Develop a plan to complete the domestic CNS implementation.

Disposition: Accepted

FAA accepts the recommendation to develop a detailed implementation plan for the domestic CNS. A joint working group consisting of representatives from FAA's APM, AES and AAT organizations has been formed to review the scope of the project based on level I and II design documents. The FAA Office of Budget (ABU) will determine whether the CNS project should be operations or F&E funded.

Recommendation 2: Perform a detailed review of all APM CNS program interfaces.

Disposition: Partially Accepted

The need to perform a detailed review of all CNS program interfaces will be addressed by the working group of recommendation 1.

Recommendation 3: Prepare a formal transition plan for CNS relocation.

Disposition: Partially Accepted

The need to prepare a formal transition plan for CNS relocation will be addressed by the working group of recommendation 1.

Recommendation 4: Add CNS processor relocation to the NAS Plan.

Disposition: Partially Accepted

CNS processor relocation will be reviewed by the FAA/SEI contractor during the NAS plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT, and OMB will be incorporated in the 1985 edition.

5.3.2 DISPOSITION OF RECOMMENDATIONS FROM 6.3.3.2 - CENTRAL WEATHER PROCESSOR (CWP)

Recommendation 1: Continue the support to the NAS Level I Design weather working group in defining and coordinating the weather program interfaces.

Disposition: Accepted

FAA will continue to support the NAS Level I Design weather working group in defining and coordinating the weather program interfaces.

Recommendation 2: Reconcile the three independent software sizing estimates (e.g., Mitre, JPL, and SEI) and reconcile them to support a project planning baseline.

Disposition: Accepted

The FAA supported by the SEI contractor will reconcile available software sizing estimates to support project planning.

Recommendation 3: Emphasize the development of processes and software to be used in conjunction with weather radar mosaicking.

Disposition: Accepted

The weather radar mosaicking algorithms/software development is receiving and will continue to receive top priority in the CWP development.



Recommendation 5: Assure required ICD's are promptly identified and implemented early in Model 2 design cycle.

Disposition: Accepted

The SEI contractor is reviewing the interfaces already defined and assuring that required ICD's are available. Additional ICDs for the FSAS program will be developed if necessary.

### 5.3 DISPOSITION OF FLIGHT SERVICE SYSTEM (FSS) RECOMMENDATIONS

#### 5.3.1 DISPOSITION OF RECOMMENDATIONS FROM 6.3.3.1 - FSAS

Recommendation 1: Continue to monitor Model 1 system testing for indications of the contractor's ability to perform prior to rescinding the Model 2 stop work order.

Disposition: Accepted

This is currently being done. The FSAS program office is monitoring contractor's unit and subsystem level tests as well as software build tests.

Recommendation 2: Complete the planning for and assure that the scheduled Tandem Computer timing/sizing risk analysis for Model 1 and Model 2 are accomplished; also, take into consideration the results of the contractor's Model 1 performance tests.

Disposition: Accepted

FAA agrees with the recommendation. The task of planning and assuring the assessment of the tandem computer timing/sizing and performance test results will be initiated when E-Systems accomplishes Model 1 Design Qualification Test.

Recommendation 3: Establish an FAA resident team at E-Systems and implement improved schedule, earned-value, and technical performance monitors into the modified Model 2 contract.

Disposition: Accepted

The FAA is maintaining a team of key technical personnel at E system to monitor contractor performance over and above the quality reliability officers. Experience gained through on-site monitoring are being factored into the statement of work for Model 2. FAA and SEI contractor personnel are participating in this effort.

Recommendation 4: Continue planning for the early implementation of Model 2 enhancements.

Disposition: Accepted

A technical team is currently reviewing the enhancements concept from a packaging aspect and from a technical design aspect. The FAA is also initiating an effort to consider the potential of exploiting private sector capabilities. The SEI contractor is participating on this team.

#### 5.2.13 DISPOSITION OF RECOMMENDATIONS FROM 6.3.2.17 - TPX-42 REPLACEMENT

Recommendation: The quantity required must be changed and the requested budget must be obtained.

Disposition: Partially Accepted

A requirements process is being established to review proposed changes to the National Airspace System. Future new requirements will be subject to rigorous system engineering analysis to determine costs, benefits and required schedules. These analyses will be heavily supported by the SEI contractor. The determination to accept substantial new requirements as part of the NAS Plan, however, requires additional monetary resources for both contractual and operations and maintenance cost.

The benefits and costs for the new NAS Plan project requirements identified by the SEI contractor will be established during the NAS Plan update process. If approved by the NAS Plan EXCOM, the Administrator, the DOT and the OMB, they will be incorporated in the 1985 edition of the NAS Plan.

5.2.12 DISPOSITION OF RECOMMENDATIONS FROM 6.3.2.16 - BRITE

Recommendation 1: Program should be monitored to define and minimize impact of schedule slippage.

DISPOSITION: Accepted

Major procurement milestones for the D-BRITE program are being monitored by the program office. In addition, the program office is assisting the procuring agency (United States Air Force) where possible to expedite the procurement process.

Recommendation 2: The implementation (site activation) sequence should be reexamined to provide for first deliveries to those sites not having radar display capability today to improve ATC system safety and efficiency at these locations.

Disposition: Accepted

THE D-BRITE implementation sequence is currently being reviewed by the program office and FAA regions. The review will examine the urgency of replacing outdated BRITE systems at existing airports versus the need to provide radar display capability at new sites to improve air safety and efficiency. Any changes required in the 1984 edition of the NAS Plan must be approved the NAS Plan EXCOM, the Administrator, DOT and OMB.

Recommendation 3: The decision (FDAD or D-BRITE system) in the ARTS-III ETG project (2-03) should be monitored so that those requirements could be integrated into this project if the decision is to go with the D-BRITE system.

Disposition: Accepted

The FAA is currently considering the use of D-BRITE to satisfy ETG pilot display requirements. ARTS III displays made available by replacement of existing N.Y. TRACON verticals with FDAD will be used as ETG controller trainee displays.

5.3.11 DISPOSITION OF RECOMMENDATION FROM 6.3.3.11 - GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE RECORDERS

Recommendation: The FAA should perform a trade study to compare costs and data quality of alternative approaches to improve antennas/receivers at each GOES recorder site.

Disposition: Accepted

The FAA Technical Center has been tasked to investigate the technical merits of using satellite antennas/receivers at the recorder sites. The investigation includes a determination of how the satellite data will be processed and presented to the specialist. This effort will be completed during FY-85. Assuming a favorable outcome of the above effort, a cost analysis of alternatives will be conducted in FY-86.

5.3.12 DISPOSITION OF RECOMMENDATION FROM 6.3.3.13 - INTEGRATED COMMUNICATIONS SWITCHING SYSTEM (ICSS)

Recommendation: The contracting arrangement, through DECCO, for this leased service--within the context of a Program Plan that places the bulk of site integration, TELCO coordination, and cutover responsibility on the Regions--is a major contributing factor in the problems cited above. It is recommended that the FAA Headquarters assume an expanded role in the ICSS project by providing more centralized coordination for project implementation and configuration management.

Disposition: Accepted

FAA accepts the recommendation that Headquarters assume an expanded role in the ICSS project by providing more centralized coordination for project implementation and configuration management.

#### 5.4 DISPOSITION OF GROUND-TO-AIR (G/A) SYSTEMS RECOMMENDATIONS

##### 5.4.1 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.2 - COMMUNICATIONS FACILITIES CONSOLIDATION

Recommendation 1: The number of locations required for 2000-foot coverage developed by the networking study has more validity than the 1118 planning figure used in the NAS Plan. This number (2165) should be used to recompute the costs and benefits to be achieved through the consolidation of facilities.

Disposition: Partially Accepted

Whereas FAA agrees that the 1118 facility consolidation planning figure used in the NAS Plan is no longer technically feasible, the 2165 figure also may not be cost beneficial. Rather than commit to that facility consolidation figure, we prefer to indicate that consolidation will result in a "lesser number of facilities." Costs and benefits will be determined during the next fiscal year.

Recommendation 2: The specific isolation devices and installation techniques required to achieve satisfactory channel quality have not been identified. These devices should be identified and demonstrated at the FAA Technical Center (FAATC) to provide installation standards for consolidated facilities. This project should include evaluation of dielectric antenna structures.

Disposition: Accepted

FAA is presently conducting a study to identify isolation devices and installation techniques required to support the facility consolidation project. This study effort is being accomplished by APM, FAA Technical Center, and ECAC.

5.4.2 DISPOSITION OF RECOMMENDATION FROM 6.3.4.3 - VORTAC

Recommendation: RMM development should be monitored to ensure that an appropriate interface with VORTAC is established.

Disposition: Accepted

FAA headquarters engineering personnel are working with FAA regions, southwest and central, to develop an appropriate RMM interface for VORTAC equipment.



#### 5.4.3 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.4 - NONDIRECTIONAL BEACON

Recommendation 1: Perform frequency interference studies to validate need for additional NDB frequencies and subsequent bandwidth changes.

Disposition: Accepted

The recommended NDB study has been performed by Special Committee 146 of the Radio Technical Commission for Aeronautics (RTCA) with significant FAA participation.

Recommendation 2: Resolve the quantity disagreement between the NAS Plan and current NDB site listing.

Disposition: Accepted

The NDB program will be reviewed by APM with support from the SEI contractor. During the process, the quantity disagreement will be resolved.

Recommendation 3: Continue monitoring closely RMM development so that appropriate interface equipment can be provided to retrofit the existing NDBs. (All the NDBs have RMM capabilities incorporated).

Disposition: Accepted

RMM requirements have been included in the pending NDB contract. Additionally, FAA's Alaskan region is developing an RMM system for retrofitting existing NDB systems. The SEI contractor in support of RMM implementation will assure that all required interface equipment is provided.

#### 5.4.4 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.5 - SUPPLEMENTAL NAVIGATION SYSTEM MONITORS

Recommendation 1: Perform an analysis to determine the operational requirements for GPS monitoring and verify/modify the currently planned monitoring system design as needed to meet the operational requirements.

Disposition: Accepted

The FAA has tasked TSC with performing an analysis to determine the operational requirements for GPS monitoring, procedure development and flight inspection. This analysis will include a determination of how many monitors will be needed, where they will be located, how data from the monitors will be used, and how failures will be identified and accommodated.

Recommendation 2: Perform a similar analysis/design for Loran-C and Omega VLF.

Disposition: Partially Accepted

There is no plan for the FAA to monitor Omega or VLF communication signals. An extensive plan, however, will be developed for placement and operation of LORAN-C signal monitors. Prior data indicates that real time LORAN-C monitor information will not be needed for aircraft operations but will be needed by Air Traffic personnel to grant clearances. The rationale for monitor siting and operations is in development. This plan will include resource requirement for procedure development and flight inspection.

Recommendation 3: Define RMM requirements in the monitor for each type of system.

Disposition: Accepted

The requirements for RMM of each type of system will be defined.

#### 5.4.5 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.6 - INSTRUMENT LANDING SYSTEM

Recommendation 1: Update the NAS Plan to reflect quantities of ILS actually provided to date and presently planned for.

Disposition: Partially Accepted

There is no discrepancy in the quantities. Two hundred and five is the original quantity under contract DOT-FA79WA-4329; 141 is the additional quantity under Mod 12 of that contract. No implication can be drawn as to whether the systems were used for establishment or replacement projects. Forty-nine under the original contract together with 139 under the Mod 12 were used for a replacement total of 188.

Recommendation 2: Finalize ILS/MLS networking plans to determine additional ILS required.

Disposition: Accepted

No additional ILS equipment beyond those approved under policy letter dated October 16, 1984, will be programmed. The ILS/MLS networking plans will evolve as the approved ILS/MLS equipments are deployed.

#### 5.4.6 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.7 - Microwave Landing System

Recommendation 1: Monitor progress of frangibility designs through analysis and testing to support the extension of the frangibility concept to MLS equipment.

Disposition: Accepted

The MLS program office is coordinating the requirement for frangible design within the agency and providing guidance to the contractor.

Recommendation 2: Develop program controls to assure schedules and resource allocations.

Disposition: Accepted

The SEI contractor is tasked to develop program controls to assure schedules and resource allocations.

#### 5.4.7 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.8 - RUNWAY VISUAL RANGE

Recommendation 1: The cost/technical advantages of combining AWOS and RVR at airports which are scheduled to receive both systems should be evaluated, especially for those airports which do not require Category B systems. The visual range sensor technology being considered for AWOS should be evaluated to determine if it is capable of meeting Category IIIB requirements.

Disposition: Accepted

The FAA has requested technical support from the SEIC to accomplish the task associated with this recommendation.

Recommendation 2: The RVR Program milestones may require rescheduling due to delay in release of the Request for Proposal. The comparative cost of retaining old technology RVR Systems (which do not have an RMM interface and retain the high maintenance cost sensors) versus replacing all RVRs with a new technology should be evaluated.

Disposition: Accepted

RVR milestones will be reviewed by the FAA/SEI contractor during the NAS Plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT and OMB will be incorporated in the 1985 edition.

FAA's APM organization will investigate the comparative cost of retaining old technology RVR systems vs. replacing all RVRs with a new technology. We anticipate the completion of this study within 24 months.

#### 5.4.8 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.11 - DIRECTION FINDER

Recommendation 1: Establish a study program to evaluate the technical and operational impact, if any, of the planned collocations with other navigation and communications facilities.

Disposition: Accepted

FAA has instituted a study to investigate issues regarding collocation of DF equipment with other navigation and communications facilities.

Recommendation 2: Revise NAS Plan schedule to reflect impact of 3-month slippage in approval process.

Disposition: Accepted

The potential for a 3 month slippage in the DF procurement process will be reviewed by the NAS Plan working group during the NAS Plan update process. The NAS plan will be updated to reflect the potential slippage and its impact on DF implementation as necessary.

Recommendation 3: Finalize DF network plan to determine quantities for the planned procurement.

Disposition: Accepted

The DF network plan is being finalized to determine the total quantities required for the DF procurement. Any differences in quantities between the DF network and NAS Plans will be reconciled. Changes to DF quantities approved by the NAS Plan EXCOM, the Administrator, DOT, and OMB will be incorporated in the 1985 edition of the NAS Plan.

Recommendation 4: Finalize cost data after quantities are determined.

Disposition: Accepted

Any cost changes associated with the change in quantities will be reviewed by the FAA/SEI contractor during the NAS Plan update process. Changes in DF program cost approved by the NAS Plan EXCOM, the Administrator, DOT and OMB will be incorporated in the the 1985 edition of the NAS Plan.

Recommendation 5: Coordinate the DF program, which provides an interface for the FSAS, with the FSAS design.

Disposition: Accepted

Interface coordination between the DF and FSAS designs is being accomplished within FAA.

#### 5.4.9 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.12 - MODE-S/DATA LINK

Recommendation 1: Increased management emphasis is recommended to ensure the timely development of data link uses and services so that full benefits of the system, as stated in the NAS Plan, will be realized.

Disposition: Accepted

Mode S serves as the transmission media for data link messages and is proceeding into the implementation phase. The Data Link applications are being defined by the user community and FAA organizations which are responsible for development and implementation of data link services. Particular management attention is being focused on the definition of these services through the requirements and design processes with the support of SEI contractor.

Recommendation 2: A structured ICD process should be established with each interfacing project.

Disposition: Accepted

Level I design document identifies the interfaces associated with the MODE-S/Data Link program. The interfaces identified will be further defined by interface control documents (ICDs) which will be under configuration control. The SEI contractor supports both the Level I design and the configuration control process.

5.4.10 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.13 - TERMINAL RADAR (ASR) PROGRAM

Recommendation 1: The ASR-9 design has anticipated interface requirements with other NAS Plan projects. It is recommended that these external interfaces be reviewed and formal interface control be established. Since ASR-9 CDR is imminent (9/84), interface issues must be resolved quickly to avoid cost and schedule impact to the ASR-9 program.

Disposition: Accepted

The ASR-9 is being designed to interface with existing systems. A configuration management process supported by the SEI contractor is in place to control interfaces and proposed changes.

Recommendation 2: Similar interface control should be established for the leapfrog program.

Disposition: Accepted

A configuration management process supported by the SEI contractor is in place within FAA to control any interface changes required by the leapfrog program.



4.11 DISPOSITION OF RECOMMENDATION FROM 6.3.4.14 - AIRPORT SURFACE DETECTION  
EQUIPMENT (ASDE-3) RADAR

Recommendation: The NAS Plan project description should be updated to reflect the requirement for some dual ASDE-3 installations and the currently planned number of system installations.

Disposition: Partially Accepted

The requirements process is being established to review proposed changes to the National Airspace System. Future new ASDE-3 requirements will be subject to rigorous system engineering analysis to determine costs, benefits and required schedules. These analysis will be heavily supported by the SEI contractor. The determination to accept substantial new requirements as part of the NAS Plan, however requires additional monetary resources for both contractual and operations and maintenance costs.

The benefits and costs for the new NAS Plan project requirements identified by the SEI contractor will be established during the NAS Plan update process. If approved by the NAS Plan EXCOM, the Administrator, the DOT, and the OMB, they will be incorporated in the 1985 edition of the NAS Plan.

## 2 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.15 - LONG RANGE RADAR PROGRAM

Recommendation 1: The NAS Plan should be updated to remove references to the  
as a gap filler.

sition: Accepted

elation of ASR-9 equipment for the Long Range Radar program will be  
wed by the FAA/SEI contractor during the NAS Plan update process.  
es to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM,  
dministrator, DOT and OMB will be incorporated in the 1985 edition.

Recommendation 2: Priority should be given to finalizing the national  
illance network study to determine the impact on the LRR program. If the  
ts of the study indicate additional LRR are needed, the coverage  
rements should be analyzed for possible adjustment on an area-by-area  
with the goal of reducing the number of radars necessary, consistent  
flight safety.

sition: Accepted

AA is currently conducting a study to determine the number of long range  
s (LRR) required to satisfy air traffic requirements as part of the  
nal Surveillance Network. During this year's update of the NAS Plan,  
the participation of the SEI contractor, FAA will determine the  
cations of the network study on NAS Plan costs and benefits. If the  
r of LRRs required for the National Surveillance Network proves to be  
bitive in terms of cost, we will review the Air Traffic enroute coverage  
rements on an area-by-area basis with the goal of providing the number of  
s necessary for flight safety.

Recommendation 3: The FAA should promptly establish the 3-D radar program  
e and finalize the joint procurement agreement with the Air Force.  
wing these actions, close coordination between the FAA program office and  
ir Force will be required to ensure a timely procurement of 3-D radars.

sition: Accepted

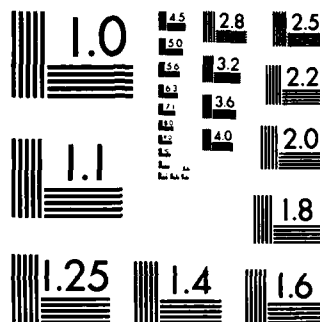
AA is working closely with the United States Air Force for procurement of  
adars as part of an overall effort to improve the National Airspace  
m. The FAA is also considering the establishment a 3-D radar program  
e within the confines of personnel and funding restrictions.

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NL

END

## REFERENCES



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

#### 5.4.13 DISPOSITION OF RECOMMENDATIONS FROM 6.3.4.16 - WEATHER RADAR PROGRAM

Recommendation 1: An adequate working relationship between FAA, DOC and DOD should be ensured and development of NEXRAD should be continued.

Disposition: Accepted

A joint program office consisting of FAA, DOC and DOD has been established to ensure the engineering, development, and system implementation of NEXRAD.

Recommendation 2: NEXRAD's operational use in the Air Traffic Control System should be defined and developed.

Disposition: Accepted

The operational concept for NEXRAD use will be defined and developed in accordance with the disposition of audit recommendation 6.2.10, NAS operations concept.

Recommendation 3: The NAS Plan should be updated to reflect the change from 11 to 13 non-CONUS NEXRADs.

Disposition: Partially Accepted

A requirements process is being established to review proposed changes to the National Airspace System. Future new NEXRAD requirements will be subject to rigorous system engineering analysis to determine costs, benefits and required schedules. These analysis will be heavily supported by the SEI contractor. The determination to accept substantial new requirements as part of the NAS Plan, however requires additional monetary resources for both contractual and operations and maintenance costs.

The benefits and costs for the new NAS Plan project requirements identified by the SEI contractor will be established during the NAS Plan update process. If approved by the NAS Plan EXCOM, the Administrator, the DOT, and the OMB, they will be incorporated in the 1985 edition of the NAS Plan.

Recommendation 4: Weather algorithms should be fully defined.

Disposition: Accepted

Weather algorithms will be fully defined in accordance with the NAS operations concept and the system design.

## 5.5 DISPOSITION OF INTERFACILITY COMMUNICATIONS SYSTEMS RECOMMENDATIONS

### 5.5.1 DISPOSITION OF RECOMMENDATION FROM 6.3.5.2 - DATA MULTIPLEXING

Recommendation: The Data Multiplexing project should continue as scheduled. It should continue to meet and exceed its original objectives. As computer tools and models become available from EDM Corporation to the SEIC, multiplex systems engineering should be used to attempt to derive even greater cost savings and operational benefits.

Disposition: Accepted

We accept the recommendation that the Data Multiplexing project should continue as scheduled. The project meets or exceeds its original objectives. As computer tools and models become available to the SEI contractor from the EDM Corporation, multiplex systems engineering will be used to attempt to derive even greater cost savings and operational benefits.

#### 5.5.2 DISPOSITION OF RECOMMENDATIONS FROM 6.3.5.4 - TELEVISION MICROWAVE LINK

Recommendation 1: The current FAA philosophy is aiming toward an integrated nationwide system, making maximum use of FAA-owned microwave transmission links. This is being accomplished under the RML Replacement and Expansion project. It is suggested that TML project be integrated into the RML Replacement and Expansion project and use the same standards, specifications, and procurement. The RML project already requires transmission of a wideband analog circuit such as the BRITE television signal. In this manner, equipment standardization will be obtained, and the TML can act as local extensions of the RML carrying common user circuits that are currently leased wherever it is cost effective.

Disposition: Rejected

The recommendation to use the same procurement is not feasible. The same manufacturers do not provide both RCL and TML equipment. Furthermore, the cost involved in overcoming the technical limitations of the TML; e.g., it is a simplex system with limited capacity; offsets any justification for using them in the RCL network.

Recommendation 2: Analyses/tests should be performed to assure that TML will support the BRITE display requirements. Requirement should be verified/modified based on the results of these analyses/tests.

Disposition: Partially Accepted

TMLs are currently in use by the FAA and these systems fully support FAA's BRITE display requirements. Additional analyses/tests are not required.

### 5.5.3 DISPOSITION OF RECOMMENDATIONS FROM 6.3.5.6 - NATIONAL DATA INTERCHANGE NETWORK (NADIN) 1A

Recommendation 1: Determine system capacity, interfaces, and features necessary to support new or changed user requirement in the 1985-1988 timeframe. This effort should also address the issue of which users, and when, will transition to X.25 Packet Mode on X.25 PAD service, and which users will be handled by store-and-forward service.

Disposition: Accepted

SEIC project support has been tasked to accomplish this activity based on input material to be provided by FAA and CONTEL.

Recommendation 2: Determine the proper roles and requirements for network management and resource management for NADIN. Develop a plan to provide such support by FAA organizational responsibility or by subcontracting.

Disposition: Accepted

Actions to provide for network management and resource management are underway. Details of these actions are contained in the system implementation plan prepared by the NADIN program office. There have been ongoing efforts since late November 1983 which include: training in-house and contractor personnel; staffing positions at the switch sites and the Technical Center; and developing and implementing orders and procedures in conjunction with the Air Traffic Service, the NADIN program office, the two switch sites, and the Technical Center. Additionally, the second level support facility at the Technical Center is training personnel to assume their field support responsibilities; the Technical Center has been staffed with in-house and contractor personnel; the technical center has been provided with operational test and development hardware.

Recommendation 3: Update NAS Plan to agree with schedule in the smart sheets.

Disposition: Partially Accepted

The NADIN 1A project will be reviewed by FAA/SEI contractor during the NAS Plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT and OMB will be incorporated in the 1985 edition.



5.5.4 DISPOSITION OF RECOMMENDATIONS FROM 6.3.5.7 - NATIONAL DATA INTERCHANGE NETWORK (NADIN) 2

Recommendation 1: A network integration effort needs to be added to the program schedule.

Disposition: Accepted

The SEI contractor will develop and document an integration/transition plan. A schedule has been developed. FAA coordinated inputs to the plan will be provided by APM, CONTEL, and MITRE.

Recommendation 2: An activity needs to be identified to do NADIN 2 transition planning prior to network implementation. This activity will identify when and how network users will be serviced by NADIN 2, and what users not serviced by NADIN 1A are to be included.

Disposition: Accepted

The SEI contractor will develop and document an integration/transition plan. A schedule has been developed. FAA coordinated inputs to the plan will be provided by APM, CONTEL, and MITRE.

#### 5.5.5 DISPOSITION OF RECOMMENDATIONS FROM 6.3.5.8 - RADIO CONTROL EQUIPMENT

Recommendation 1: The quantity discrepancies between NAS Plan, the smart sheets, and the RCE Specification should be resolved.

Disposition: Accepted

The radio control equipment project will be reviewed by FAA/SEI contractor during the NAS Plan update process. Changes to the 1984 edition of the NAS Plan approved by the NAS Plan EXCOM, the Administrator, DOT, and OMB will be incorporated in the 1985 edition. Any discrepancies between the NAS Plan, smart sheets and RCE specification will be resolved.

Recommendation 2: The RCE specification defines both physical and functional partitioning of the equipment, which must be followed by the developer to be responsive to the specification. This level of detail should be reevaluated to determine if it unduly restrains the developer or increases the uncertainty of cost or schedule performance by the contractor.

Disposition: Accepted

We have reevaluated the level of detail in the RCE specification and find the current level necessary to maintain the modularity concept.

Recommendation 3: The contract should include development of special module-to-module interface controls for the design and test of the RCE, as well as more frequent-than-usual contract progress milestones and FAA reviews.

Disposition: Accepted

Provisions are being made for the contract to include development of special module-to-module interface controls. Contract progress milestones and FAA review will be commensurate with the complexity of the dual contractor effort.

## 5.6 DISPOSITION OF MAINTENANCE AND OPERATIONAL SYSTEM SUPPORT RECOMMENDATIONS

### 5.6.1 DISPOSITION OF RECOMMENDATIONS FROM 6.3.6.1 - REMOTE MAINTENANCE MONITORING SYSTEM (RMMS)

Recommendation 1: The FAA should augment present project management authority by establishing a charter for the program manager which would provide him the direction and latitude to tie all facets of the overall RMM program together.

Disposition: Accepted

We are in the process of establishing a single program manager responsible for implementing the 80's Maintenance Program and coordinating all related implementation activities (RMMS, Lead Sector, etc.).

Recommendation 2: An indepth systems analysis requirements review should be undertaken to update the program definition and compare the results to the NAS-MD-792, RMMS Operational Requirements.

Disposition: Accepted

An indepth system requirements analysis is underway. The ongoing effort described for recommendations 6.2.11 and 6.2.15 will satisfy this recommendation.

Recommendation 3: A Systems Requirements Review (SRR) and/or a Systems Baseline Review (SBR) should be held subsequent to the requirements definition. These reviews should address both the transition (Phase II) and the final (Phase III) systems.

Disposition: Accepted

This review will take place immediately after the requirements activities described in the responses to recommendations 6.2.11 and 6.2.15 are completed.

Recommendation 4: An end-to-end procurement strategy for the RMMS final system should be prepared and a program implementation plan written. Effect on the transition phase of such final system strategy should be examined.

Disposition: Accepted

A System Implementation Plan (SIP) is in preparation by APM. This plan includes the procurement strategy for RMMS and in conjunction with other ongoing efforts, will be used to examine the effects of the strategy on the transition system.

Recommendation 5: An indepth telecommunications study should be undertaken to identify data flow needs and technical programmatic requirements on the communications system.

Disposition: Accepted

The scope of such a study is presently being formulated by APM. The SEI contractor will be tasked to assist in the performance of the study and has already initiated activity.

Recommendation 6: Further study on the Tandem computer's current and growth capability to meet the requirements of the final system is required.

Disposition: Accepted

Such further study is being performed in conjunction with the above telecommunications study. This study will use previous studies, recently developed descriptions of the Maintenance Control System (MCS), and Maintenance Management System (MMS), and other documents relating to data flow and information requirements for RMMS.

Recommendation 7: Interface controls need to be implemented. Formal ICD's and ICD working groups should be established. Monitoring philosophy and guidance should be prepared for all program managers of equipment to be monitored.

Disposition: Accepted

NAS-MD-790, interface control document for RMMS has been updated and will be configuration managed. Additionally, Level I and II design documents define system interfaces will be configuration managed and will provide guidance to all program managers of remote monitored equipment.

#### 5.6.2 DISPOSITION OF RECOMMENDATIONS FROM 6.3.6.2 - COMPUTER BASED INSTRUCTION

Recommendation 1: CBI training should be expanded and used to the extent possible. This is for existing systems within the FAA as well as new systems that are contractor maintained.

Disposition: Accepted

The use of CBI training within the FAA is being expanded to include more and more courses taught at the FAA Academy. This applies to existing and planned new equipment.

Recommendation 2: Existing equipment should be updated to take advantage of FAA-owned links on a cost versus benefit basis.

Disposition: Accepted

To the extent that it is both technically feasible and cost effective, FAA-owned telecommunications links will be used for CBI training.

### 5.6.3 DISPOSITION OF RECOMMENDATION FROM 6.3.6.3 - CRF

Recommendation: A formal review team should be established to perform a systems requirements analysis and define those requirements necessary for a viable CRF program. The review areas would include determination and resolution contract versus FAA maintenance issues, determination of appropriate number of CRFs, and investigation of calibration laboratories and their disposition.

Disposition: Accepted

The CRF program has been evaluated with consideration given to contract maintenance, the appropriate number of CRFs and the use of calibration laboratories. The results of this evaluation will be included in the 80's maintenance implementation plan and factored into the next edition of the NAS Plan.

#### 5.6.4 DISPOSITION OF RECOMMENDATION FROM 6.3.6.4 - MCC

Recommendation: The results of the Fredericksburg maintenance conference to define system maintenance requirements to support the goals of the NAS Plan, especially as they pertain to the role of the MCC, should be evaluated. Results of other current engineering studies and the SEI/FAA maintenance role definition should be merged with the Fredericksburg maintenance conference results.

Disposition: Accepted

The MCC program has been evaluated in light of the results of the Fredericksburg maintenance conference and other engineering studies. The results of this evaluation will be included in the 80's maintenance implementation plan and factored into the next edition of the NAS Plan.

.6.5 DISPOSITION OF RECOMMENDATION FROM 6.3.6.5 - AIRPORT POWER CABLE LOOP  
SYSTEMS

Recommendation: The candidate airports should be analyzed in more depth and the number of systems recommended on the basis of need and cost/benefit in lieu of current basis of available funding.

Disposition: Accepted

The candidate airports, of which there are approximately 100 in number, will be analyzed in more depth. To assist the regions in identifying their candidate airports, a directive is being prepared. This order, when published, will provide FAA regions with the criteria for airport selection. It will further allow for the prioritization of the candidates based on cost/benefit analysis rather than available funding.



|       |   |
|-------|---|
| NM    | Nautical Mile                                 |
| CDAPS | Oceanic Display and Planning System           |
| OMB   | Office of Management and Budget               |
| OMEGA | VLF Navigation System                         |
| OPS   | Operations                                    |
| ORD   | Operational Readiness Demonstration           |
| ORT   | Operational Requirements Team                 |
| OST   | Office of the Secretary                       |
| PAM   | Peripheral Adapter Module                     |
| PCS   | Power Conditioning System                     |
| PDR   | Preliminary Design Review                     |
| RCE   | Remote Control Equipment                      |
| RCL   | Radio Communications Link                     |
| RFA   | Request for Approval                          |
| RFP   | Request for Proposal                          |
| RML   | Radar Microwave Link                          |
| RMMS  | Remote Maintenance Monitoring System          |
| RMMSG | Remote Maintenance Monitoring Steering Group  |
| RMS   | Remote Maintenance Subsystem                  |
| RRWDS | Radar Remote Weather Display System           |
| RTCA  | Radio Technical Commission for Aeronautics    |
| RVR   | Runway Visual Range                           |
| SBR   | Systems Baseline Review                       |
| SEI   | System Engineering and Integration            |
| SEIC  | System Engineering and Integration Contractor |

|         |  |
|---------|--|
| LCN     | Local Communication Network                    |
| LIS     | Logistics Inventory System                     |
| LORAN   | Long-Range Navigation (System)                 |
| LRR     | Long Range Radar                               |
| MCC     | Maintenance Control Center                     |
| MCS     | Maintenance and Control Software               |
| MEA     | Maintenance Engineering Analysis               |
| MIL-STD | Military Standard                              |
| MLS     | Microwave Landing System                       |
| MMS     | Maintenance Management System                  |
| MODE-C  | Altitude Reporting Mode of Secondary Radar     |
| MODE-S  | Discretely Addressable Secondary Radar System  |
| MPS     | Maintenance Processor Subsystem                |
| MSAW    | Minimum Safe Altitude Warning                  |
| MSPE    | Modeling and Simulation Program Element        |
| NADIN   | National Data Interchange Network              |
| NAILS   | National Airspace Integrated Logistics Support |
| NAR     | National Airspace Review                       |
| NARACS  | National Radio Communication System            |
| NAS     | National Airspace System                       |
| NASA    | National Aeronautics and Space Administration  |
| NDB     | Non Directional Beacon                         |
| NEXRAD  | Next Generation Weather Radar                  |
| NICS    | NAS Interfacility Communications System        |

|         |   |
|---------|---|
| ERM     | En Route Metering                                 |
| ETG     | Enhanced Target Generator                         |
| EXCOM   | Executive Committee                               |
| FAA     | Federal Aviation Administration                   |
| FAA-STD | Federal Aviation Administration Standard          |
| FCC     | Federal Communications Commission                 |
| FDAD    | Full Digital Automated Display                    |
| FDIO    | Flight Data Input/Output                          |
| F&E     | Facilities and Equipment                          |
| FL      | Flight Level                                      |
| FSAS    | Flight Service Automation System                  |
| FSS     | Flight Service Station                            |
| GAO     | Government Accounting Office                      |
| GOES    | Geostationary Operational Environmental Satellite |
| GPS     | Global Positioning System                         |
| HIWAS   | Hazardous In-Flight Weather Advisory Service      |
| IBM     | International Business Machine                    |
| ICD     | Interface Control Document                        |
| ICSS    | Integrated Communications Switching System        |
| IFR     | Instrument Flight Rules                           |
| ILS     | Instrument Landing System                         |
| I/O     | Input/Output                                      |
| IVRS    | Interim Voice Response System                     |
| IWG     | Interface Working Group                           |
| JPL     | Jet Propulsion Laboratory                         |

|         |   |
|---------|---|
| ATIS    | Automatic Terminal Information Service            |
| AVS     | Associate Administrator for Aviation Standards    |
| AWOS    | Automated Weather Observation System              |
| BRITE   | Bright Radar Indicator Terminal Equipment         |
| CAMI    | Civil Aeromedical Institute                       |
| CBI     | Computer Based Instruction                        |
| CCB     | Configuration Control Board                       |
| CDR     | Critical Design Review                            |
| CNS     | Consolidated NOTAM System                         |
| CONUS   | Continental United States                         |
| CRA     | Conflict Resolution Advisory                      |
| CRF     | Central Repair Facility                           |
| D-BRITE | Digital Bright Radar Indicator Terminal Equipment |
| DARC    | Direct Access Radar Channel                       |
| DCP     | Design Competition Phase                          |
| DECCO   | Defense Commercial Communication Ordering Office  |
| DF      | Direction Finder                                  |
| DOC     | Department of Commerce                            |
| DOD     | Department of Defense                             |
| DOT     | Department of Transportation                      |
| EARTS   | En Route Automated Radar Tracking System          |
| E-DARC  | Enhanced Direct Access Radar Channel              |
| ECAC    | Electromagnetic Compatibility Analysis Center     |
| EFAS    | En Route Flight Advisory Service                  |

## GLOSSARY OF ACRONYMS AND CONTRACTIONS \*

|       |   |
|-------|---|
| AAP   | Advanced Automation Program                           |
| AAS   | Advanced Automation System                            |
| AAT   | Associate Administrator for Air Traffic               |
| ABU   | Office of Budget                                      |
| ACAT  | AERA Controller Advisory Team                         |
| ACF   | Area Control Facility                                 |
| ADL   | Associate Administrator for Development and Logistics |
| AERA  | Automated En Route Air Traffic Control                |
| AES   | Systems Engineering Service                           |
| AF    | Airway Facilities                                     |
| ALG   | Acquisition and Materiel Service                      |
| AMT   | Administrator's Management Team                       |
| AP    | Acquisition Phase                                     |
| APM   | Program Engineering and Maintenance Service           |
| APO   | Office of Aviation Policy and Plans                   |
| ARP   | Associate Administrator for Airports                  |
| ARTCC | Air Route Traffic Control Center                      |
| ARTS  | Automated Radar Terminal System                       |
| ASDE  | Airport Surface Detection Equipment                   |
| ASR   | Airport Surveillance Radar                            |
| AT    | Air Traffic   |
| ATC   | Air Traffic Control                                   |
| ATCT  | Airport Traffic Control Tower                         |

\* Not all acronyms and contractions used in this document conform with the approved FAA list.

5.6.13 DISPOSITION OF RECOMMENDATIONS FROM 6.3.6.18 - GENERAL SUPPORT  
LABORATORY

Recommendation 1: Detail requirements must be defined in Level III Design and preliminary requirements that identify long-lead items that must be procured early.

Disposition: Accepted

The FAA has already tasked the SEI contractor with Level III design planning. As part of this planning, detailed requirements are to be defined and long-lead items are to be identified.

Recommendation 2: Authority to acquire long-lead items must be provided.

Disposition: Accepted

The FAA currently has in place the various levels of authority for obligating government dollars for an authorized project. This is prescribed in FAA order 2500.3E dated 7/10/83.

Recommendation 3: Project updates and changes should be assessed for potential FAA Technical Center requirements and transmitted to ACT as soon as possible.

Disposition: Accepted

The FAA is currently developing policy to standardize test and evaluation procedures within the FAA. When this is complete, it will define the coordination procedures to be followed by the program office and the FAA Technical Center for NAS projects.

Recommendation 4: The "Strategic Plan for FAA Technical Center Facilities" needs to be expanded in scope to specify development of a FAA Technical Center/SSL specification/documentation tree in support of NAS Plan implementation.

Disposition: Accepted

The strategic plan for FAA Technical Center, dated September 1983, needs to include FAA Technical Center NAS integration activities. The plan will be updated with SEI contractor support after the test planning standard has been published. It will include both short term (System Integration) and long term (Field Maintenance Support) objectives for systems support provided by the FAATC.

Recommendation 5: Development of a test and integration plan to define required FAA Technical Center tasks, roles and responsibilities, and responsibilities for each of the F&E Plan projects.

Disposition: Accepted

The test planning standard for test and evaluation is under development with SEI contractor support. This standard is the model against which all NAS projects will be compared for test and evaluation purposes. The guidelines contained will be applicable to subsystems developed by ADL, and will serve as a basis for implementing FAA policy on NAS subsystem and system test and evaluation. It covers the spectrum of test activities from conceptual development, through acquisition, integration into the NAS, installation and ORD.

5.6.12 DISPOSITION OF RECOMMENDATIONS FROM 6.3.6.17 - SYSTEM SUPPORT  
LABORATORY

Recommendation 1: Detail requirements must be defined in Level III Design and preliminary requirements that identify long-lead items that must be procured early.

Disposition: Accepted

The FAA has already tasked the SEI contractor with Level III design planning. As part of this planning, detailed requirements are to be defined and long-lead items are to be identified.

Recommendation 2: Project updates and changes should be assessed for potential FAA Technical Center requirements and transmitted to ACT as soon as possible.

Disposition: Accepted

The FAA with SEI contractor support is currently developing policy to standardize test and evaluation procedures within FAA. When this is complete, it will define the coordination procedures to be followed by the program office and the FAA Technical Center for NAS projects and the support to be provided by the system support laboratory.

Recommendation 3: Projects selected for the SSL test bed will be determined by system complexity, interfaces, etc., and will be determined on a case-by-case basis. Those projects so selected should be directed to schedule their first prototype/production article into the SSL test bed for full development and system integration testing. Exceptions may be necessary, but only when precoordinated and approved by the NAS program director (ADL-2). If currently contracted projects are not complying with these objectives/goals, units must be scheduled into the test beds as early as possible to increase the fidelity of the test bed for future system testing and troubleshooting of field-related problems.

Disposition: Accepted

The FAA with SEI contractor support plans to examine each project selected for the SSL test bed on a case by case basis. Some projects may or may not be scheduled for full development and integration testing depending on the risk involved, system complexity, etc. However, the overall FAA objective like that stated in the SEI recommendation is to increase the fidelity of the test bed for future system testing and troubleshooting field-related problems.



5.6.11 DISPOSITION OF RECOMMENDATION FROM 6.3.6.16 - General Support

Recommendation: The LIS design should be reviewed to ensure that no unnecessary duplication of data bases is contained in the MMS.

Disposition: Accepted

The AES organization is coordinating the LIS-MMS interface and interactions. One of the specific areas of review concerns the avoidance of data base duplication.

#### 5.6.10 DISPOSITION OF RECOMMENDATIONS FROM 6.3.6.15 - NAS SPECTRUM ENGINEERING

Recommendation 1: A determination should be made on whether there is a need to use ECAC services in providing coverage charts and, if affirmative, submit cost estimates for funding.

Disposition: Accepted

The FAA with the support of SEI contractor plans to make a cost vs benefit analysis and develop recommendations on the use of ECAC services.

Recommendation 2: FAA management should consider budgeting for additional people to assist in implementing NAS Plan (Level IV Design/siting of equipments) specifically as required for spectrum changes and/or analyses of spectrum compatibility.

Disposition: Partially Accepted

Budgeting for additional people cannot be made because of personnel ceilings imposed on FAA. However, FAA management will investigate the possibility of personnel reassignment to frequency management based on relative priorities for project support within the System Engineering Service organization.

#### 5.6.9 DISPOSITION OF RECOMMENDATIONS FROM 6.3.6.13 - SEI CONTRACT

Recommendation 1: Review and adjust, as necessary, SEI contractual schedule to NAS Plan schedules.

Disposition: Accepted

SEI contractual schedules will be adjusted as necessary in the areas of program management/control tools. Contract schedules and support have already been revised in the areas of advanced automation program support and project management support.

Recommendation 2: Review major system milestones in light of project procurement activities and propose changes as necessary.

Disposition: Accepted

Major milestones are being reviewed in light of project procurement activities. Level II Design has commenced early and acceleration of Level III/IV Designs is being investigated by both the FAA and SEI contractor. A decision on any change in Level III/IV Design schedules is expected by December 1984.

5.6.8 DISPOSITION OF RECOMMENDATION FROM 6.3.6.12 - AIRCRAFT FLEET CONVERSION

Recommendation: Senior FAA management should aggressively pursue convening the TSARC to preclude further schedule delays and attendant loss of revenues.

Disposition: Accepted

TSARC was convened on September 11, 1984.

5.6.7 DISPOSITION OF RECOMMENDATION FROM 6.3.6.7 - POWER SYSTEMS

Recommendation: Compression of the installation and upgrading schedule should be considered to replace some obsolete equipment sooner.

Disposition: Accepted

The installation and upgrading schedule will be compressed. The regions will identify candidate facilities in February 1985, and effort will be initiated and continued on a priority basis.

5.6.6 DISPOSITION OF RECOMMENDATIONS FROM 6.3.6.6 - POWER CONDITIONING SYSTEMS  
FOR ARTS-III

Recommendation 1: Identify facility modifications to mechanical and electrical systems required to support this program.

Disposition: Accepted

A national standard facility modification design package is being prepared by APM through a task order to an A&E contractor.

Recommendation 2: Revise schedule to reflect delay in equipment procurement and lengthened installation period.

Disposition: Accepted

The delivery schedule will be revised based on a PCS contract award in September 1984 for the first 31 systems and on funding for FY 1985 for the last 23 systems.

|         |   |
|---------|---|
| SIP     | System Implementation Plan                        |
| SPB     | Site Program Bulletin                             |
| SRR     | System Requirements Review                        |
| SSL     | System Support Laboratory                         |
| SSRVT   | Sector Suite Requirements Validation Team         |
| S/W     | Software  |
| TCS     | Tower Communications System                       |
| TELCO   | Telephone Company                                 |
| TML     | Television Microwave Link                         |
| TMS     | Traffic Management System                         |
| TPX42   | Radar Beacon Decoder Equipment                    |
| TRACALS | Traffic Control and Landing System                |
| TRACON  | Terminal Radar Approach Control Facility          |
| TSARC   | Transportation Systems Acquisition Review Council |
| TVOR    | Terminal VHF Omni Directional Radio Range         |
| VFR     | Visual Flight Rules                               |
| VHF     | Very High Frequency                               |
| VLf     | Very Low Frequency                                |
| VORTAC  | Collocated VOR AND TACAN Facility                 |
| VSCS    | Voice Switching and Control System                |
| WCP     | Weather Communications Processor                  |
| WMSC    | Weather Message Switching Center                  |

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